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Translation

SOVIET SCIENCE AND TECHNOLOGY POLICY

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SOVIET SCIENCE AND TECHNOLOGY POLICY

This non-serial report contains selected translations of Russian articles on the planning and administration of Soviet research and development and the introduction of scientific achievements into industry.

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FEDOSEYEV REPORT AT USSR ACADEMY OF SCIENCES' ANNUAL GENERAL MEETING

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 7, Jul 81 pp 11-27

[Report by Academician P. N. Fedoseyev, vice-president of the USSR Academy of Sciences: "The 26th CPSU Congress on the Tasks of Science in the New Five-Year Plan"]

[Text] The 26th Congress of the Communist Party of the Soviet Union, which took place under circumstances of great political enthusiasm, was a notable event in the life of our party and of the Soviet people, of the fraternal socialist countries, and of the international communist and workers' movement. The general party forum of the CPSU was a phenomenon of true epochal significance, which will have a powerful and favorable influence on the course of future historical development.

All progressive mankind followed the work of the congress with profound attention and hope; the eyes of all champions of freedom and happiness among peoples, of peace and detente, and of friendship and cooperation among nations were turned toward the Kremlin Palace.

A vivid demonstration of the enormous international authority of the CPSU and the vitality of principles of internationalism was the attendance at the congress of delegations from 123 communist workers' and national-democratic parties and organizations from over 100 countries of the world and speeches at the congress by representatives of these parties and organizations.

The work of the 26th CPSU Congress demonstrated with special force the indestructible unity of the party, its solidarity behind the Central Committee headed by the distinguished leader of our party and of the international communist movement and the faithful successor of the great work of Lenin, the General Secretary of the CPSU Central Committee, Comrade Leonid Il'ich Brezhnev.

The report given at the congress by L. I. Brezhnev received unanimous approval by the delegates of our party and the Soviet people and all Soviet scientists and has roused extreme interest all over the world. This is a party document of program significance, a notable contribution to the theory and practice of scientific communism. The congress resolved wholly and fully to approve the report by Comrade L. I. Brezhnev -- the Report of the CPSU Central Committee -- and to make this report the basis for the work of all party organizations.

The report by Comrade L. I. Brezhnev provided comprehensive elucidation on the activities of the party in realizing the decisions of the 25th CPSU Congress, generalized the experience in building communism, pointed out the vast achievements of our country during the last decade, deeply analyzed the economic changes and social processes that took place during this period, vividly depicted the prospects for the future movement of our country on the road to building communism. The report gave a Marxist-Leninist analysis of the present international situation and the world revolutionary process, defined the tasks in the struggle for peace, detente, and cooperation among nations and for social progress.

"Today," said Leonid Il'ich, "the world situation requires new, additional efforts to eliminate the threat of war and to strengthen international security." And it is quite natural that these efforts proceed above all from our party and from the first country of socialism in the world, which is putting into practice the principles of Leninist external policy. Evidence of this are the new, exceptionally important proposals made by Comrade L. I. Brezhnev from the high rostrum of the 26th CPSU Congress. These proposals represent the further development of the Program for Peace, developed by the 24th and 25th CPSU Congresses and express the will and aspirations of the Soviet people.

Soviet scientists fully share and warmly support the genuinely humanistic Program for Peace proclaimed by the party. The general meeting of the Academy of Sciences unanimously approves L. I. Brezhnev's proposal to create an authoritative international committee which could show the vital necessity for averting nuclear catastrophe. It can be said with satisfaction that many noted foreign scientists also welcome this proposal. We must make all effort for the world community to bring this about.

I would especially like to speak about the truly creative and profoundly optimistic atmosphere in which the 26th CPSU Congress took place. We all understood the unusual enthusiasm and fervor which greeted Leonid Il'ich's report and the excitement and pride when the delegates spoke of the vast accomplishments of the party and the people during the past pariod and about the successes achieved in all sectors in the building of communism. At the same time, the reports and speeches, with all the directness and frankness that is the custom of our party, dealt with shortcomings, ommissions, and unsolved problems -- so that effective measures can be taken for overcoming the difficulties that arise in the path of our movement toward the great goal.

The decisions of the 26th CPSU Congress, which can quite rightly be called historic, have embodied the basic principles of the party's internal and external policies and have provided a comprehensive and specific program for the economic and social development of our country during the 11th Five-Year Plan and the period to 1990. These decisions continue the basic strategic line set by the 24th and 25th CPSU Congresses and express the continuity of our movement from five-year plan to five-year plan on the road to communism and the consistant course toward the steady improvement in the people's well-being. At the same time, they reflect the special features of the present stage of developed socialist society and also new demands being placed on the management of the economic structure and social development.

All the work of the 26th CPSU Congress provides the Soviet people with the orientation that the chief tasks of the new five-year plan and of the whole ten years

ahead can be accomplished only on the basis of intensifying social production and increasing the effectiveness and quality of work, of accelerating scientific-technical progress, of improving labor productivity, and of raising the level of social and labor activity of the Soviet people.

In examining the questions relating to intensification of civil production, one can distinguish three decisive areas. First, strict economy of all kinds, more effective utilization of all materials and energy, and elimination of waste in the economy, including agricultural products. V. I. Lenin said that economic work requires "thriftiness." This thought was stressed by L. I. Brezhnev, who said, at the congress, that economics must be economical. Secondly, there must be fuller utilization of productive capacities, the elimination of waste of workers' time, and better organization of production and labor. Thirdly, there must be more improved, more productive machines, mechanisms, assemblies, and automatic systems, and the development and application of more effective technology.

The 26th CPSU Congress paid a great deal of attention to the tasks of further developing science and, on this basis, accelerating scientific-technical progress. "The party of communists," Comrade L. I. Brezhnev stressed in his report, "proceeds from the assumption that building a new society is simply inconceivable without science." The congress indicated the necessity to move all economic sectors to the advanced frontiers of science and technology. This goal of the congress is the concretization of the historic task of organically uniting the achievements of the scientific-technical revolution with the advantages of socialism.

The scientific-technical revolution is expanding under the circumstances of a heightened struggle between two world systems when, on the one hand, the power and world influence of the forces of socialism, national liberation, and social progress are growing and, on the other hand, the general crisis of capitalism is intensifying and all its contradictions are deepening while, at the same time, the aggressiveness of imperialism is strengthening.

Under present conditions, imperialist strategists are putting especially large stakes into the utilization of scientific-technical achievements and an arms race. The successes of the scientific-technical revolution are themselves being directed more and more toward creating monstrous means for mass annihilation of people and toward the incitement of war hysteria. Under these conditions, the question of increasing the effectiveness of our civil production on the basis of utilizing all possible achievements of the scientific-technical revolution is the pivotal problem not only for the development of socialist society but for all of human civilization.

The imperialists calculate that, by relying on a developed production base, on a high scientific-technical potential and qualified personnel and by intensifying their robbery of economically poorly developed countries and exploiting the workers of their own countries, and by increasing their military power, they can occupy a dominant position on the fronts of the scientific-technical revolution and achieve economic and military supremacy over the whole world.

American imperialists intend to use their scientific-technical base and military force for purposes of leading the capitalist world and as a pressure lever on young national states to interfere with their movement toward social progress, applying

all means, even up to armed intervention, against liberation movements. But the main intent of American imperialism is to build up armaments and scientific potential, particularly military scientific potential, to surpass the defense potential and retard the economic growth of the Soviet Union and countries of the socialist fraternity, to undermine the historic worldwide achievements of real socialism, and to turn back the course of the historical process.

Allotting increasing financial resources, technical equipment, and qualified personnel to the development of scientific-technical potential, the American imperialists are trying at the same time to slow down the development of Soviet science in the most important areas. Under various pretexts (sometimes under the banner of protecting "human rights" and sometimes under the pretext of the "Soviet military threat" or "U.S. national security"), American rulers limit and roll back scientific-technical relations with the Soviet Union on those problems in which they think that the scientific achievements of their country are more advanced than the achievements of Soviet science are. As is known, American authorities have placed an embargo on the sale to the USSR of many types of scientific-technical equipment and various materials. In the same vein, they have put pressure on other capitalist countries, trying to bring about the isolation of Soviet science from the overall progress of world science and technology and to establish a kind of scientific-technical blockade against our country and the countries of the socialist concord.

It can be stated with confidence that all Soviet scientists will take active part in the solution of the main tasks in the two basic areas which Leonid Il'ich Brezhnev spoke about in his speech to the 26th CPSU Congress -- the creation of communism and the strengthening of peace on Earth.

Scientific-technical progress in our country has as its highest goal a steady rise in the material and cultural level of people's lives and serves their fundamental interests. Scientific-technical progress is a powerful force for the growth of modern productive capabilities; it creates favorable new conditions for building the supply and equipment base for communism, and for lifting the people's well-being and improvement of the social structure and social relations, for improving labor conditions and everyday life for the people and the comprehensive development of the personality, and also for improvement in the natural environment in which man lives.

Characterizing the achievements of the Soviet people in building the supply and equipment base for communism and the role of science in the development of productive forces, L. I. Brezhnev stressed: "The scientific-technical revolution is developing in depth and breadth, changing the appearance of many factories and whole economic sectors. Soviet science occupies a leading position in the most important fields of knowledge."

Scientific achievements have been the basis for the further development or new creation in such fields as atomic machine building, space technology, electronics and microelectronics, the microbiological industry, laser technology, the production of artificial diamonds and other synthetic materials; the utilization of natural resources and the distribution of productive forces have been improved; and social relations have been made better.

Without the very active and direct participation of science and without acceleration of scientific-technical progress now in the more complex conditions of the 1980's, it is not possible to successfully develop the economy and to accomplish large social

tasks. Therefore, the acceleration of scientific-technical progress is truly a key problem in the development of our country under present conditions. "The country has a serious need," said Comrade L. I. Brezhnev in the Summary Report of the CPSU Central Committee, "for the efforts of 'big science,' along with work on theoretical problems, to be concentrated on the solution of key economic questions and on discoveries that can introduce genuinely revolutionary changes in production." This is a clear program for the development and practical utilization of the achievements of science, including fundamental science, which is the chief source of technical progress.

The achievements of science and technology can and must compensate for the growing additional expenditures of labor and resources in the economy that are related to having to use fuel and energy and raw materials from remote places that are difficult to reach. The accomplishment of this economic task is becoming a matter of first-priority importance, because the effective exploitation of the new eastern regions of the country is dependent upon it. Scientific-technical progress is called upon to overcome still another difficulty -- to provide high rates of growth of production in the face of a noticeable reduction in growth of labor resources caused by unfavorable demographic shortfalls in the next few years.

At the 26th CPSU Congress, L. I. Brezhnev stressed that "the development of science is the basic of basics for scientific-technical progress."

The documents of the congress note the growing significance of the scientific-technical potential of the country and outstanding achievements in fundamental and applied research.

A review of the development of science during the past five-year plan was given in the address of the congress by the president of the USSR Academy of Sciences, Academician A. P. Aleksandrov, and in the speeches of a number of delegates. The most important results were reflected in the messages of greetings to the 26th CPSU Congress from the USSR Academy of Sciences and the union republic academies of sciences and in the many reports by scientific institutions. Reading these materials, one can graphically visualize that significant forward progress is being achieved over a broad front of science. Scientists reported to the congress about fuller and more precise understanding of the objective development patterns in nature and society, about deeper penetration into the bowels of the Earth, into the fabric of the social organism, and into cosmic distances and the structure of the atom, and about successes in learning of the galaxy and elementary particles, the life of living cells and the growth of crystals.

Social scientists reported about research on centuries past and prospects for the future, on the basic moving forces and successive stages of the historical process, on the intensifying crisis of the outdated capitalist system and the laws for building the ascending communist structure, and on the structure and functioning of the new social organism -- from material production to political and ideological superstructure and to literature and art.

Reports of fascinating interest were given on new data that scientists have gained about energy from the sun and the atomic nucleus, new methods for treating and welding metals, the creation of artificial materials, on the development of new computing methods and equipment, on the improvement of machines to replace physical

labor and to make intellectual labor easier, on the application of lasers and glass-fiber light carriers for the transmission of information, on new chemical reagents and biotechnology, on the creation of highly productive plants and wonder-working drugs, and on the protection and rational utilization of the environment and world oceans. In short, we have a rich, meaningful scientific accumulation and good prospects for future progress in science.

Socialist society, vitally interested in expanding the scientific-technical revolution, can and must create more favorable conditions to make it possible. As was noted at the congress, however, we do not always exploit the advantages of socialism for the development of science, for increasing its effectiveness, or for accelerating scientific-technical progress.

The proposition that science is a direct productive force has become a literal truth. But this proposition must necessarily be tied with the understanding that science becomes a direct productive force only when it is embodied in the means of production and in technological developments and, subsequently, in the production of material wealth. "The close integration of science and production," stressed L. I. Brezhnev, "is an urgent requirement of the present epoch."

Unfortunately, in the implementation of scientific achievements and in the introduction of innovations into mass production, many difficulties arise. The Soviet Union has enriched the world with many discoveries which have foreordained basic improvement of the techniques and technology of production, but we ourselves, in a number of instances, are backward in the timing and the scales of application of these progressive technological methods. The congress commissioned an analysis of the reasons for the intolerable sluggishness in assimilating prospective developments.

In analyzing the reasons for such a situation, it is necessary to consider a number of circumstances, including technical-economic ones. It often happens that developments of new technology do not provide obvious technical and economic advantages in comparison with existing techniques and technology. In large part, this is caused by imperfections in the cost-accounting system, under which it is unprofitable for enterprises to make products cheaper because this leads to worsening of production indicators for the evaluation of their activity. The Summary Report by the Central Committee to the 26th CPSU Congress pointed out this circumstance with complete definity. In a number of instances, new technology causes an increase in the cost of manufactured items insofar as expenses for the production of new machinery and equipment increase substantially but their productivity increases less than the price increases. As a result, this leads to unjustified growth in the cost of end products in all the sectors that employ such technology. Intolerable lack of coordination also exists in the methods and criteria for evaluating the effectiveness of capital investment in new technology.

The analysis of these kinds of problems has long occupied a large group of economic scientists. A substantiated answer, however, has still not been given to the basic economic questions of scientific-technical progress.

Under present conditions of our country's economic development, enterprises should be vitally interested in utilizing the achievements of science and technology. The

central planning and administrative bodies and the USSR State Committee for Science and Technology, as indicated to the congress by L. I. Brezhnev, "should clearly formulate practical tasks that require maximum attention from scientists. At the same time," continued L. I. Brezhnev, "science itself should be a constant 'disturber of tranquility,' pointing out the sectors where stagnation and backwardness have been noticed and where the present level of knowledge provides an opportunity to move forward rapidly and successfully. How to turn this work into an integral part of the management mechanism must be thought through."

Exceptional importance must be attached to the assignment by the congress to the USSR Academy of Sciences, the USSR State Committee for Science and Technology, and the ministries to conduct an evaluation of the scientific and design bases of various sectors of the economy and to make proposals for certain regrouping of scientific forces.

As is known, the USSR Academy of Sciences and the republic academies give a large amount of attention to the search for new methods and forms for introducing the results of scientific research into the economy. During the course of this work, new forms are arising for cooperation by academy scientific institutions with ministerial institutes and industrial enterprises and organizations. The Siberian Department of the USSR Academy of Sciences has achieved significant successes in uniting science and production. Valuable experience has been accumulated at the Ukrainian Academy of Sciences, the scientific institutions of which concentrate their efforts on the purposeful development of those fundamental and applied research projects that provide the basis for creating conceptually new technology leading to fundamental transformations of production processes. The experience of the Siberian Department and the Ukrainian SSR Academy of Sciences have been approved by the CPSU Central Committee.

The improvement of forms for relations between science and production must be constantly in the sphere of attention of the USSR Academy of Sciences and of its departments and scientific institutions.

Experience shows that difficulties in implementing the achievements of science can be overcome by improving the organization and control of scientific research and the system and mechanism for interaction among science, technology, and production. During the past two decades, much has been done for the solution of these problems, and effective forms have been found for integrating science and production. Continuous special-purpose program planning is being implemented with the aim of uniting science and production. The drafting of special-purpose complex programs, as was stressed at the congress, will provide the possibility to unite the efforts of scientists, producers, and ministry workers in solving the most important scientific-technical problems and to reduce the time-lengths for creating and assimilating new technology.

During the last five-year plan, the USSR Academy of Sciences took active part in work on 111 scientific-technical programs out of 209 programs approved by the USSR State Committee for Science and Technology for 1976 to 1980. The Academy of Sciences was the head agancy, responsible for the fulfillment as a whole, for such important programs as "World Oceans," "Molecular Biology," "Scientific and Technical Information," and "Seismology and Earthquake-Resistant Construction." The USSR Academy of Sciences conducted a large amount of work on the energy program.

Under the 11th Five-Year Plan now beginning, it is intended to implement 160 scientific-technical programs. Projects under joint programs and plans with many ministries and agencies are being conducted by scientific institutions of the USSR Academy of Sciences. Academician A. P. Aleksandrov, the president of our academy, covered this well in his speech to the congress. Research on special-purpose programs must constantly be at the center of attention of our scientific institutions, departments, presidiums of scientific centers, and affiliates of the Academy of Sciences.

One of the effective forms of science-production integration are scientific-production associations. The experience of the best of these, which operate in large industrial centers of the country, shows that they allow more rapid introduction into practice of scientific achievements and engineering developments. Representatives from Leningrad, Sverdlovsk, Belorussia, and many other delegates spoke about this. However, things are not always like this everywhere. One reason for this is, evidently, that the economic aspects and questions of interaction have still not been fully adjusted with respect to the scientific, planning-design, and production units that have entered into scientific-production associations. There are often instances where ministries obligate the enterprises that enter into an association to fulfill their usual production program that is unrelated to the tasks of introducing the achievements of science into production. The congress asked for an end to such practice. Every scientific-production association, said Comrade N. A. Tikhonov, the chairman of the USSR Council of Ministers, at the congress, should become a large center for creating and manufacturing new high-quality products and for improving technology and the organization of production.

The USSR Academy of Sciences and the USSR State Committee for Science and Technology together with the economic ministries should examine and resolve questions relating to the improvement of work of scientific-production associations and should determine the mechanism for utilizing the results of fundamental research.

The institutes of the Department of Economics of the USSR Academy of Sciences and the Institute for State and Law of the USSR Academy of Sciences, in turn, must give practical scientific-methodological assistance to the USSR State Committee for Science and Technology, to the USSR Ministry of Finance, and to the economic ministries in the improvement of the legal-economic mechanism for the functioning of a scientific-production association.

Improvement in the organization of scientific research largely depends on its rational and efficient coordination. As is known, the 25th CPSU Congress gave a responsible assignment to the Academy of Sciences to coordinate all scientific work in the country. Such an assignment to the USSR Academy of Sciences, as the center for theoretical and fundamental research was related, first of all, to the growing significance of fundamental science as the basis for scientific-technical progress and, secondly, to the increasing role of special-purpose program planning. After the 25th CPSU Congress, the coordination of scientific research was strengthened and relations were improved with the specialized academies of science, with higher schools, and with ministerial scientific-research institutions. The topical sessions of the general meeting of the USSR Academy of Sciences had important significance in this regard. One was a session of the general meeting of the USSR Academy of Sciences (December 1978), with participation by the All-Union Academy of Agricultural Sciences imeni V. I. Lenin and the USSR Ministry of Agriculture, at which there were

discussions of the tasks of Soviet science in implementing programs for the further development of agriculture in the country. Another was a joint session of the general meeting of our academy and the general meeting of the Academy of Medical Sciences (November 1980), which examined questions relating to the development of fundamental research for medicine and public health. Extremely useful in the context of coordinating scientific research was a session of the December general meeting of the USSR Academy of Sciences, at which there were discussions of the tasks of science in solving urgent problems in the development of the economy. This work should be continued and should be improved.

Significant work has also been done on the coordination of scientific research performed at the country's higher educational institutions. In a joint decision of the presidium of the USSR Academy of Sciences and the board of the USSR Ministry of Higher and Secondary Specialized Education "On Improving Relations Between Higher Schools and the USSR Academy of Sciences," measures were outlined for the further development of research in VUZ's and for expansion of the practice of joint scientific research by academy institutes and VUZ's.

The 26th CPSU Congress pointed out the necessity for more effectively using the scientific potential of higher schools and for reducing the gap in material support between academy and VUZ science. At the same time, it is necessary to improve the training, raise the qualifications, and improve the certification of scientific and scientific-teaching personnel, and provide all possible support to the development of mass scientific-technical creativity.

The transition to the intensive path of development relates not only to production, but also to science. Intensification of research activity has become an imperative necessity. Calculations and verifications conducted in connection with the drafting of the Complex Program for Scientific-Technical Progress to 1990 and 2000, show the inevitability of retardation of the growth in numbers of scientific associates and in the total number of all workers in the sphere of science. The material and financial resources for science are also limited. Therefore, today, two interrelated problems stand out with special sharpness: the intensification of scientific research and the guarantee of priority to the development of the decisive areas of science.

The intensification of scientific research presupposes improvement in technical support to science and wider use of computers. Decisions of the congress provide for strengthening the experimental and experimental-production base for scientific-research and planning-design organizations. It is planned to significantly increase the production of instruments, equipment, automation hardware, reagents, and preparations for the conduct of scientific research.

Putting the principle of priority into practice is acquiring decisive significance. This means that provision must be made for concentrating scientific efforts and resources on the main areas on which depend the progress of science and the solution of key problems in social-economic development and for specializing the activities of the republic academies and scientific centers on the areas of scientific development that hold the most prospects. The concentration of scientific resources is necessary also for the attainment of world levels, especially in those areas where our backwardness would be particularly intolerable. In other words, the whole system of

scientific research must, as L. I. Brezhnev pointed out at the 26th CPSU Congress, be " . . . significantly more flexible and mobile, intolerant of fruitless laboratories and institutes . . . The CPSU Central Committee," he said in his Summary Report to the congress, "is in favor of further increasing the role and responsibility of the USSR Academy of Sciences and improving the organization of the whole system of scientific research." Constant improvement is needed in the network and structure of scientific institutions, in accord with the requirements of scientific-technical progress as well as timely determination of trends and changes in the direction of research and development.

In view of the decisions of the 26th CPSU Congress, it is necessary to make research programs and planned tasks for scientific developments more concrete and to put the priority principle into practice. In this regard, the USSR Academy of Sciences should keep the whole front of science within its purview, should not allow backwardness in any area, and should not overlook the possibility for creative breakthrough in some sector which, at a given time, may not seem hopeful but in the long run could yield good results.

As is known, according to a decision of the CPSU Central Committee, the draft "Basic Directions for the Economic and Social Development of the USSR for 1981 to 1985 and for the Period to 1990" was published at the beginning of December 1980 for national discussion. This discussion took place all over the country with extreme liveliness. A large number of criticisms and suggestions to the text of the document were expressed. This is clear evidence of the broad development of democratism in our country and of the practical participation of the popular masses in the resolution of important state questions.

The scientists of the country, including those of the USSR Academy of Sciences and the academies of sciences of the union republics, actively participated in the discussion of the Basic Directions.

In the final text of the "Basic Directions for the Economic and Social Development of the USSR for 1981 to 1985 and for the Period to 1990," which was approved by the 26th CPSU Congress, a large number of criticisms and additions proposed by the USSR Academy of Sciences were taken into account. Thus, the necessity for pushing ahead the development of fundamental research was stressed; of important significance in this regard was the addition concerning the necessity to assure the development and implementation of the Complex Program for Scientific-Technical Progress, which obligates the Academy of Sciences to increase attention to this extremely responsible work. The draft Basic Directions were also amended to include the thesis concerning the strengthening of interaction among the social, natural, and engineering sciences. The importance of this thesis is related to the growing scale of scientific problems and to the necessity for their complex treatment, to the prospects for research on the edges of various fields of science and, finally, to the strengthening integration of science and production.

As experience shows, in the drafting of the Complex Program for Scientific-Technical Progress, substantiation of prospects for the solution of great economic problems is possible only with agreement between the social-economic and scientific-technical aspects. On the one hand, the existing build-up in the development of science and technology largely predetermines possibilities for solving social and economic

problems; on the other hand, the progress of science and technology itself, especially in the long run, must be subordinated to the requirements for the social-economic development of the country and must make possible the solution of large economic problems.

A number of proposals by the USSR Academy of Sciences were taken into account in the formulation of areas for scientific research in the natural and social sciences and also in sections pertaining to the development of industry, agriculture, distribution of productive forces, and others.

Indeed, not all of the proposals could be included in the Basic Directions, but they should be taken into consideration in work practice. The appropriate decisions were adopted by the 26th CPSU Congress.

We all gave attention to the purposeful determination in the Basic Directions of the tasks in science and technology during the period before us. The development of science and technology must be, in still greater measure, subordinated to the solution of the most important problems in the future progress of Soviet society and to accelerating the transition of the economy to the road of intensive development.

The documents of the congress fully and specifically defined the chief areas in the development of the fundamental sciences and also the tasks relating to the solution of the urgent problems of scientific-technical and social progress on which the efforts of the workers of science should be concentrated. It is intended, first of all, to assure the development and implementation of special-purpose complex programs for the solution of the most important scientific-technical problems, to substantially reduce the time involved in creating and assimilating new technology, and to strengthen mutual relations between science and production.

Among the basic scientific areas is foreseen the development of mathematics and an increase in the effectiveness of its use for applied purposes. One of the basic problems of modern scientific-technological progress is the development and improvement of computer technology, with which is tied a whole complex of automation and control problems.

Knowledge of the microstructure of matter has been and remains one of the chief fundamental problems of science. A deeper understanding of the structure and characteristics of the interaction of elementary particles, undoubtedly, would be a very great step in conquering the forces of nature, like those that resulted from the discovery of the structure of the atomic nucleus.

Broad experimental and theoretical research is foreseen in the physics of the atomic nucleus and nuclear reactions. A large amount of attention will be given to the development of accelerator technology, research facilities, and automation of nuclear physics experimentation.

To increase the effectiveness in the use of large experimental facilities such as research reactors and accelerators, it is necessary above all to reduce as much as possible the time it takes to install them. Delay in construction sharply reduces the scientific value of the experimental data produced on such facilities.

Decisions of the congress plan for the further development of the fuel-energy complex. They provide for improvement in the structure of the fuel-energy balance and rapid development of nuclear power, including the creation of atomic electric stations with fast-breeder reaction, which allow more effective use of nuclear fuel.

As Comrade L. I. Brezhnev said in the Summary Report of the CPSU Central Committee to the 26th CPSU Congress, "Life requires continuous searching for conceptually new sources of energy, including the creation of the bases for thermonuclear power." Therefore, in the five-year plan that is beginning, we must achieve the intensive development of research on high-temperature plasma and on the problem of controlled thermocuclear synthesis. Projects also will be continued on laser and electronic thermonuclear synthesis and also on solving important engineering problems of thermonuclear power. Science, including fundamental science, is called upon to play an important role in improving methods for transforming energy and also for improving existing methods and developing new methods for energy transmission.

Having made proposals for research in physics of solids, quantum electronics, optics, and radiophysics, the Academy of Sciences must increase its attention to these problems and successfully implement its proposals. Research on the physics of semiconductors must provide for the development of the physical and technological bases of microelectronics and for the improvement of existing semiconductor instruments and the creation of new ones. A large amount of attention must be given to research on the complex of problems in the physics of solids, which opens up increasing new prospects for many sciences and production.

Comrade L. I. Brezhnev's report to the party congress stressed that it is machine building, first and foremost, that flings open the doors for what is new and advanced in scientific and engineering thought and embodies what is new and advanced in highly effective, reliable machines, instruments, and technological production lines. Machine building is the main base for bringing into reality the achievements of science and technology. At the same time, machine building is the field in which, to a greater degree than in any other, a technical base will be created to produce the equipment of the future. Therefore, in the five-year and ten-year periods, a large complex of problems will be developed to improve the quality, reliability, and productivity of machinery and to reduce their materials content and energy consumption. Great hopes in this regard are being placed on the scientific institutions of the Academy of Sciences.

In the general theory of machines, work will be done on problems relating to the creation of automatic manipulators, including industrial robots. Work is to be broadened on the theory of automatic-action machine systems.

Research on control problems will receive intensive development. Significant attention should be given to the development of the scientific bases for the automation of scientific research and experimentation.

In the five-year period now beginning, important tasks in chemical science must be accomplished. A large amount of attention must be given to the development of the theory of chemical structures, reactive capability, and chemical kinetics. The first priority problem will remain the problem of producing new polymers, physiologically active substances, composite materials, and other products with given complexes of properties. Special significance is being acquired by the development of technologi-

cal processes that provide complex and full maximum use of raw materials and which prevent the pollution of the environment, and the development of methods for producing liquid fuel from solid fuels. Increasingly important significance is being acquired by the service time of various materials in manufactured items and by the protection of metals from corrosion and polymers from aging.

The Basic Directions stress the necessity for further understanding of the mechanism for physiological, biochemical, and genetic processes of living things, the improvement of methods for the prevention, diagnosis, and treatment of common diseases, and the development of new remedies, preparations, and medical equipment.

Successes of fundamental research in the biological sciences, especially its physical and chemical areas, have provided intensive development of traditional applied areas such as technical biochemistry, technical microbiology, synthesis of biologically active compounds, and have opened up conceptually new possibilities for solving a large number of practical problems. Genetic engineering has come about and is already providing its first practical results. Biotechnology, an area with important future prospects, has been formed, with orientation toward the use of biological agents and processes for practical purposes. The Basic Directions provide for the concentration of efforts on the development of biotechnical processes for production of products used in medicine, agriculture, and industry.

In the five-year period now beginning, work will be developed for introducing highly productive varieties of plants, strains of livestock, and cultures of microorganisms and for creating new physiologically active substances for the needs of agriculture and medicine.

The development of research is envisaged in the fields of the rational utilization and conservation of the country's land and water resources and the chemicalization, mechanization, electrification, and automation of agriculture. Long-range programs have been drafted in these very important areas. New academy scientific institutions have been created: The Institute for the Social-Economic Problems in the Development of the Agrarian-Industrial Complex of the USSR and the Institute of Biochemistry and Physiology of Plants and Microorganisms are beginning operation in Saratov.

Scientists of the USSR Academy of Sciences are participating in the development of the USSR food program for 1981 to 1985 and for the period to 1990, which is being implemented according to the decision of the October (1980) plenum of the CPSU Central Committee and the 26th CPSU Congress. The fulfillment of research related to the implementation of this program is a most important task for academy scientific institutions.

Research will be developed in the fields of geology, geophysics, geochemistry, and mining sciences. This research is directed toward explaining the geological structure and history of the development of the Earth and earth's crust and also toward evaluating the conditions for the origin, distribution patterns, and rational means of utilizing in the economy of important groups of useful minerals.

During the new five-year plan, there will be a continuation of the study and mastery of cosmic space in the interests of developing science, technology, and the economy.

With the aid of space technology, research will be conducted on a larger scale on natural resources and on processes in the atmosphere and Earth's surface.

A characteristic of mature socialism, as Comrade L. I. Brezhnev has pointed out, is the closer interrelation between the development of the economy and the social-political progress of society. And this requires further intensification in the development of social sciences and significant strengthening of research in the humanities.

Being guided by the decisions of the 25th CPSU Congress, Soviet social scientists in the last five-year plan concentrated efforts on the development of urgent problems in Marxist-Leninist theory, the patterns and trends in the development of our society, construction of the supply and equipment base for communism, improvement in production relations, changes in the social structure of society, and the consolidation of the socialist form of life. A large amount of attention has been given to working on urgent problems in the further development of Soviet democracy, the improvement of nationality relations, and fraternal cooperation of nations under the conditions of mature socialism. Social scientists of the USSR Academy of Sciences have taken active part in the analysis of theoretical problems relating to the new USSR Constitution and in work on the development of legislative activity based on it.

In their research, social scientists have made a definite contribution to the development of the concept of developed socialism. During the past five years, serious scientific works have been created that are devoted to the history and theory of socialist society, illuminate the experience of world socialism, and reveal the patterns of the world revolutionary process. As noted in L. I. Brezhnev's report, there is some good research on the history of the international workers' movement, the present stage in the general crisis of capitalism, and the development of state-monopoly capitalism. Serious steps have been made in the study of present international relations. In a word, as L. I. Brezhnev has said, a large amount of work has been done and it deserves recognition. Far from everything is satisfactory, however, in the field of social sciences. Unfortunately, the tendency toward scholastic theorization noted at the 25th CPSU Congress has not been fully overcome. Works in philosophy frequently repeat and prove well-known truths instead of analyzing the new phenomena of life. Often, research by social scientists is replaced by contrived "innovations" and by the construction of different variants of systems of categories that often differ only in the sequence of presentation. Much time and effort are wasted on fruitless discussions surrounding some conceptions and definitions in philosophy, sociology, political economy, and in some other fields too.

At the same time, new events and trends in socialist economics and in the political life of society are being inadequately analyzed, and the task bequeathed by Lenin of working out a theory of materialist dialectics as a total world-view and methodological system is being accomplished too slowly, and public opinion is being studied poorly. A large amount of attention is required by the problems of the social consequences of the scientific-technical revolution and of communist mass education in close relationship with the social-economic policies of the state, and many others.

The Summary Report by Comrade L. I. Brezhnev is a notable model of the enrichment and further creative development of Marxist-Leninist theory. In it, the paths for the further overall progress of the society of developed socialism are outlined, its

characteristics are provided integration, and specificity is given to such fundamental problems as the features and prospects for the development of the supply and equipment base for developed socialism, with consideration of the requirements for the intensive type of growth in production and in achievements of the scientific-technical revolution, of the dialectics of the interaction of economic, social, political, and spiritual processes, and of the sequence of stages of developed socialism and communism.

On the basis of the generalization of the experience of developing the social-class structure of our society during the last decade, the Summary Report of the CPSU Central Committee to the 26th CPSU Congress pointed out the real possibility that the formation of a classless structure of society will take place largely and basically within the historical framework of mature socialism. A substantial theoretical contribution will be made thereby to Marxist-Leninist teaching on the correlation of the two phases of the formation of communism from the point of view of the development of their social structure. With consideration of this perspective, largely new analysis should be done on problems such as the convergence of the two forms of property, the wiping away of differences between city and country and between intellectual and physical labor, prospects for the development of the political system of socialism, and so forth.

In our multinational state, science must carefully consider nationality questions and the strengthening of friendship among peoples. The dialectics of nationality relations during the stage of developed socialism consists of moving toward the full integration of nations and nationalities, not through ignoring or wiping out their national-cultural distinctions, but on the basis of their gradual convergence and the development of each of them on the basis of fraternal cooperation and mutual understanding.

Many new positions are contained in the sections of the Summary Report of the CPSU Central Committee that speak about strengthening the material and spiritual bases of the socialist form of life and the forming of the new man and about the development of the world socialist system.

Of principal importance is the idea of the close interrelation between social-economic policy and party mass education work and of the necessity for building all work for improving the socialist form of life and for overcoming negative manifestations in people's conduct on the solid foundation of social-economic policy.

The congress stressed with new force the international character of socialism and gave attention to the necessity for countries of the socialist fraternity "to learn from one another." Characterizing the dynamics and basic directions of development of the world socialist fraternity, after pointing out that both in the internal development of each socialist country and in the development of their cooperation with one another new tasks and problems constantly appear, L. I. Brezhnev noted that it would be incorrect "to paint a picture of the present socialist world in solid, holiday colors. There are also complications in the development of our countries." The 26th CPSU Congress gave a profound and scientifically based answer as to the reasons for and the ways of overcoming these complications.

L. I. Brezhnev's report and the materials of the 26th CPSU Congress have given a scientific analysis of new phenomena in the world of capitalism, the features of the

present stage in the general crisis of capitalism, the growing political role of developing states in the world arena, and urgent problems in the international communist and workers' movement.

The totality of the problems on which the efforts of social scientists need to be focused was formulated in concentrated form in the Summary Report of the CPSU Central Committee to the 26th CPSU Congress and in the "Basic Directions for the Economic and Social Development of the USSR for 1981 to 1985 and for the Period to 1990." A number of important tasks suggest the generalization of the experience of the revolutionary-reorganization activity of the CPSU and the international communist and workers' movement. The completion of fundamental works on the history of the CPSU and on the theory and history of the international workers' movement have important significance in this regard.

At the center of theoretical activity, there must be work on the problems of dialectical and historical materialism, scientific communism, and political economy. The lagging work on fundamental works on these problems must be speeded up. Research activity must be raised to a new level at institutes of the humanities, especially at institutes of philosophy, sociological research, and a number of others also. The All-Union Conference on the Philosophical Questions in the Natural Sciences in April should be conducted at a high scientific level; it should generalize and advance work on basic world-outlook and methodological problems in contemporary science. We attach much significance to the philosophical and methodological seminars which involve hundreds of thousands of scientists and carry out important research and mass-education functions.

Research should be continued on the theoretical questions and prospects in the development of socialism, the creation of the supply and equipment base for communism, improvement in production relations, the intensification of the economy, and the increase in effectiveness of civil production for the purpose of achieving high end economic results.

One urgent area of scientific investigation in the next few years remains the development of ways to raise further the level of management in the economy, the introduction of advanced methods for socialist administration, fuller combining of centralized control with economic independence and initiative of enterprises, and more effective interaction between ministerial and regional planning and control. It is necessary to speed up work on creating an organizationally smooth mechanism for complex special-purpose planning, for the elimination of agency barriers, and for assuring the needed level of responsibility for the fulfillment of the planned measures by appropriate ministries and agencies and the timely support of programs with efficient management and supply and equipment resources.

Conceptually important significance is being attached to research on problems of communist mass education and the comprehensive and harmonious development of the personality and of the socialist form of life.

For national education, mass education, and cultural construction, there is great significance for the development of the whole complex of historical sciences and research in the fields of psychology and ethics and literature and language.

In a number of basic areas of scientific research, there are proposals for studying the pattern of development of the world socialist system, the problems of socialist economic integration, and external economic relations. In accord with the directives of the congress, it is necessary to activate substantially the study of the experience and the most important trends in the internal political life of the brother countries of socialism and of prospects for strengthening socialist integration and the development of international and socialist division of labor.

The complication of the world economic situation, the strengthening interrelation and mutual influence of economic and political processes in world development, and the persistent attempts by the aggressive imperialist circles to poison the international atmosphere and to intensify confrontation and military hostility in international relations attach paramount importance in the research work of social scientists to deep and specific study of various aspects of world economic development, to the economies of capitalist and developing countries, and to the further development of methods and methodologies for forecasting social-economic and political world trends. There must be analysis of class movements and internal political contradictions in the citadels of imperialism and specific explanations of the reasons for the intensification of its aggressiveness. The significant strengthening of the role of developing countries in international life requires the uniting of the efforts of international specialists of various types in complex work on the problems of the social-economic development of "third-world" countries, questions relating to the democratization of the international economic order, and negative effects of neocolonial practices of multinational corporations.

Social scientists, in their research activity, should keep in mind the decisions of the 26th CPSU Congress on introducing necessary changes and additions to the CPSU Program now in force. This has to do with generalizing new experience in the building of socialism and communism and with giving deep scientific characteristics to the development of socialist society as a historically necessary, natural stage in the formation of the communist structure, and with reflecting the conceptually important phenomena of international life. All of this requires active research by social scientists on the real problems in building communism and the world revolutionary process.

The urgent task of social scientists is to intensify criticism of anticommunism, of bourgeois and revisionist concepts of social development, and to unmask the falsifiers of Marxism-Leninism and all possible anti-Soviet fabrications in hostile propaganda.

L. I. Brezhnev's report directed attention to the noticeable intensification of the ideological struggle in the present world. "For the West," he said in the Summary Report of the CPSU Central Committee to the 26th CPSU Congress, "it is not just the opposition of ideas. It sets in motion a whole system of means calculated to undermine the socialist world and break it apart. The imperialists and their accomplices are systematically conducting a hostile campaign against socialist countries. They blacken and pervert everything that takes place in these countries. For them the most important thing is to turn people away from socialism."

Scientific analysis of and propaganda on the advantages of socialism, the socialist form of life, and socialist culture, mass education in Soviet patriotism and devo-

tion to communism, the development of the bases for world outlook, and methodologies for ideological work and struggle -- are the paramount obligation of scientists, especially of our institutes of the humanities. We cannot allow and must persistently overcome underevaluation of this work and passivity in this matter.

In the fulfillment of the tasks placed before Soviet science, scientific cooperation with foreign scientific institutions, first of all with the scientists of socialist countries, can be a substantial reserve. The decisions of the 26th CPSU Congress provide for all possible development of scientific-technical relations with socialist countries. The utilization of the advantages of the international division of labor, the total scientific-technical potential of the countries of the socialist fraternity, and the organization of joint research on urgent problems have great significance both for our country and for other socialist countries. Valuable experience has been accumulated in this regard. It is necessary in the future to develop and improve the forms for cooperation, to develop and implement joint programs in the natural and social sciences, and to increase the effectiveness of research.

Proceeding from principles of peaceful coexistence of states with differing social systems, the decisions of the congress provide for bringing about scientific-technical relations with capitalist countries. We will continue the implementation of existing agreements for scientific cooperation and to develop cooperation in work on global scientific problems such as environmental protection, research on and peaceful exploitation of space, the study of world oceans, and others.

The discussion of the decisions of the 26th CPSU Congress and of the conclusions and actions of the USSR Academy of Sciences, of course, are not limited to the present session of the general meeting of the USSR Academy of Sciences. It apparently would be advisable to discuss questions relating to the development of "big energy" in the light of decisions by the 26th CPSU Congress, at a special session of the academy. The proposals for conducting sessions in the not too distant future on questions relating to new engineering and technology and also on mineral resources, and on environmental protection and ecological problems deserve attention.

It is necessary also to conduct scientific conferences jointly with other scientific institutions on such important topics as "The 26th CPSU Congress and the Development of Marxist-Leninist Theory" and "Urgent Problems in Education and Mass Education in the Light of the Decisions of the 26th CPSU Congress."

Our publishing activity and the work of our numerous journals, various scientific societies, and councils must be subordinated to the fulfillment of the decisions of the congress.

All ranks of Soviet scientists unanimously assure the CPSU Central Committee and the General Secretary of the CPSU Central Committee, L. I. Brezhnev, personally, that they will devote maximum efforts toward the fulfillment of the historic decisions of the 26th CPSU Congress and will always wholeheartedly serve our socialist Motherland, the consolidation of her power and authority, and the strengthening of peace throughout the world.

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SELECTED SPEECHES FROM 1981 GENERAL ANNUAL MEETING OF USSR ACADEMY OF SCIENCES

Markov on Department of Nuclear Physics

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 7, Jul 81 pp 62-64

[Speech by Academician M. A. Markov to the annual general meeting of the USSR Academy of Sciences]

[Text] In my speech I would like to touch only on several problems that face the Department of Nuclear Physics of the USSR Academy of Sciences during the current five-year plan.

During the five year plan, the Leningrad "PIK" research nuclear reactor will be put into operation; it is analogous to the French reactor at Grenoble, which is operated by the FRG, France, and Britain -- that is, we have a national center of enormous importance which requires new forms for organizing scientific research. For this, it is necessary to create an appropriate coordination council, to have a housing fund for taking care of specialists coming from other cities for various time periods, and so forth.

Also during this five-year plan, another unique facility will begin to go into operation -- a meson factory, analogous to one in the United States, which is operated by more than 200 institutes. This facility will be of interest to many of the natural science departments of the academies of sciences. In the operation of such a multi-purpose facility, important scientific organization problems will also arise, and they are of the type with which we still do not have much experience.

The third large structure that will be completed during this five-year plan is the Baksan neutrino station.

Thus, the Department of Nuclear Physics is faced with huge scientific-organization tasks. One of them, following the directives of the 26th CPSU Congress, is the maximum compression of the periods for finishing the above-mentioned structures. The department hopes for substantial aid in this from the presidium of the USSR Academy of Sciences.

As for research that is being conducted in the department, it can be reported that about 50 cases have been registered in which neutrinos come from the other side of the Earth, that is, passing through the whole globe.

There are not many statistics, but still they give interesting results, particularly with respect to so-called neutrino oscillation. Research at this station permits making a conclusion about the lifetime of a proton: $T > 10^{30}$ years.

Leading scientists working in the field of theoretical physics are now engaged in building a fundamental theory that unites all interactions into a principle. In this connection, in a number of theories the result appears as a corollary that the proton is unstable and its lifetime is less than 10^{30} years. The unique result produced at the Baksan station shows substantial influence on the theory, canceling out a number of theoretical schemes.

Modern science is characterized, on the one hand, by narrow specialization and differentiation of scientific areas and, on the other hand, by the introduction into these narrowly specialized fields of the results of often very broad research. The introduction to other fields can take place through the methodologies that arise in nuclear physics and then turn out to be unusually effective for these narrow areas.

For example, is it an accidental circumstance that the Academy of Sciences originated the idea of creating a united council of the Academy of Medical Sciences and our academy for the utilization in medicine of the fundamental research produced in many fields of science? This applies not so much to fundamental research of recent times but to results produced over the long history of these sciences.

A story of Academician A. L. Mints' comes to mind, about the improvements and the instruments he made on his own initiative for medical scientists on the basis of results long known in a given field but not known to the medical scientists.

It seems to me that we are obligated to medical scientists. Using our achievements, they can raise medical equipment and work conditions in medicine to a level that could make the possibilities of medicine phenomenal. This also pertains to other fields of science.

A Scientific Council for the Application of the Methods of Nuclear Physics in Related Fields has been created in our department. The possibilities and consequences of applying nuclear methods in other fields are almost unlimited and the effects of application, tremendous.

The results that nuclear research has produced and continues to produce should be valued. Although it began as abstract and fundamental research, not having practical connections, it permitted the creation of mechanisms and possibilities for observations that have turned out to be effective in many fields of science.

At the same time, in examining the work of the council, the regular session of the department concluded that the efforts made were insufficient, considering the tasks and possibilities opened up by nuclear methods in various fields of science. In this connection, there seems to be interest in the proposal by the president of the USSR Academy of Sciences, Academician A. P. Aleksandrov, to use specialist personnel from various institutes to work directly for this council. In this way, the possibilities of the council could be significantly broadened and its activities could be made more effective. The appropriate departments of the Academy of Sciences should support this initiative and select qualified and enthusiastic workers who would accomplish this responsible and very serious task.

Velikhov on Academy Work

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No.7, Jul 81 pp 70-72

[Speech by Academician Ye. P. Velikhov to the annual general meeting of the USSR Academy of Sciences]

[Text] The pledge of success for Soviet science is the deep mutual understanding and mutual confidence that has existed traditionally among scientists, the party, and the government from the beginning of the Soviet state and was demonstrated in the very clear Summary Report by the CPSU Central Committee to the 26th CPSU Congress. The report, as is known, mentioned questions that pertain to the internal development of Soviet science. These will be discussed at special sessions devoted to the development of power, machine building, and other questions posed in the Summary Report of the CPSU Central Committee.

I would like to dwell on several particular problems related to the internal development of science and pertaining primarily to academy projects. The report by the chief scientific secretary of the academy, G. K. Skryabin, sets forth the activities of the Academy of Sciences, but I would like to add one stroke to the list of recent achievements of the USSR Academy of Sciences.

I am speaking of thermonuclear research, particularly about the fact that at the beginning of the 1970's, TOKAMAK, a new scientific area began to develop, the concept for which was worked out under the direction of Academician L. A. Artsimovich at the Institute of Atomic Energy imeni I. V. Kurchatov. It must be stated that at first several trends developed simultaneously for the magnetic containment of plasma but, by the end of the 1970's, tokamak projects reached the level that now the International Atomic Energy Agency (a rather conservative organization because it includes many physicists from small countries that have cautious policies) recognized that the scientific foundations actually existed for entering into the construction of the first technological thermonuclear reactor. Such work was begun and is being conducted under the direction of the International Atomic Energy Agency in Vienna. This reactor is based on the TOKAMAK concept.

Finally, in September 1980, the United States passed a law on the development of controlled thermonuclear synthesis. It is foreseen that in 1990 a demonstration facility will have been created and, by the end of the century, the first experimental industrial facility which, according to an estimate, will cost 20 billion dollars. And it can be stated with satisfaction that, in this instance, one of the largest national scientific programs of the United States is based on the TOKAMAK concept, which was proposed by Soviet science.

Returning to our urgent matters, we must discuss a question that relates to the effectiveness of research, first of all, of that which fully lies within the jurisdiction of the Academy of Sciences. It is very important to support the research of leaders. We talk much about the need to support those that lag, but we also must not forget the leaders.

I will introduce some examples from among the projects of the Section for the Physical, Engineering, and Mathematical Sciences of the USSR Academy of Sciences, in

As is known, in earth astronomy, we have had somewhat modest successes that are related to the difficulties of creating instruments for space research. But there is one very important area -- the so-called gamma bursts -- in which clear proof has been produced that gamma bursts are related to neutron stars, and a number of physical parameters have been defined. The Physico-Technical Institute imeni A. F. Ioffe and the Institute for Space Research have produced significant information on neutron stars. Thus, with relatively modest expenditures, thanks to the inventiveness of the scientists, our country has preeminence in this area. Some other areas can be named. They include the very interesting work by the Institute of Physical Problems imeni S. I. Vavilov on quantum crystals; we also have preeminence in this area.

A large amount of attention should be given also to an area of research that is developing in the Academy of Sciences and in higher schools (the Institute of the Physics of the Earth imeni O. Yu. Shmidt, the Institute of Crystallography imeni A. V. Shubnikov, and Moscow State University) -- the study of gravitational waves. It is based on the works of Professor V. B. Braginskiy and on achievements of the Institute of Crystallography in producing sapphire crystals. In this field, one of the greatest discoveries of our time could occur and, even if negative results were achieved, it is still very important and interesting work which must be supported, the more so since expenditures on it are fully within reach.

We should turn our attention to still another important project being done at the Physics Institute imeni P. N. Lebedev of the USSR Academy of Sciences (FIAN). At the very beginning of research on thermonuclear synthesis there were two concepts -- tokamak and the stellarator, which American scientists started to develop. But, having met difficulties, they closed down this project and, despite warning by Academician L. A. Artsimovich about the good prospects for such work, they switched completely to tokamak. And only at FIAN was it shown that if you really analyze the topology of magnetic fields in complex physical phenomena, then this area does not yield bad results. Later, this was confirmed by research conducted in the FRG and Britain. FIAN work in this area is also worthy of large support.

Very important research, the idea for which came from Academician L. A. Artsimovich, is being conducted at the Leningrad Physico-Technical Institute on a small "Tuman" tokamak. This, evidently, is one of the quickest ways to create plasma in small volume for studying hot thermonuclear reactions. These projects lie within the range of the economic capabilities of the academy, and financing for this special purpose must be supported.

In addition, the Academy of Sciences can create a large experimental base that will allow solution of the problems relating to support for the work of the large telescope.

In the future five-year plan, large experimental facilities, such as the Baksan neutrino observatory and the PIK reactor in Leningrad, will go into operation. The Institute of the Physics of High Pressures has created a large press, but it must be stated that this facility and the support of its projects require quite large budgetary expenditures.

I want to touch on the question of computer technology. We have a Coordination Committee on Computer Technology, but the Academy of Sciences must pay more attention

to the development of projects in this field. Important projects related to the physical principle of creating elements are conducted in three of our institutes: FIAN, the Institute of Radioelectronics, and the Leningrad Physico-Technical Institute. But we need to turn our attention to two circumstances. First, the projects need to be coordinated so that scientists engaged with this problem are tied in with those who are developing the architecture of the machine. Academician B. N. Petrov has taken steps in this direction, and we need to carry this work through to the end.

Secondly, it is necessary to create in the institutes their own technological base for implementing the tasks in developing instruments. It is important that a technological base be created and centralized for these projects.

Let me say a few words about machine building. A decision should be made on the question proposed by Academician A. I. Tselikov, that is, following the example of the coordination center for computer technology, to create a coordination center for machine building, which would unite the work of the Department of Mechanics and Control Processes, the Department of Physical Chemistry and the Technology of Inorganic Materials, and the Department of General Physics and Astronomy. In addition, it must rely on large industrial institutes that are prepared to cooperate with the Academy of Sciences.

Finally, as noted at the 26th CPSU Congress, insufficient attention is being given in the Academy of Sciences to the development of the material base, particularly to design bureaus. The situation must be corrected during the current five-year plan. The solution of this important problem will allow overcoming the difficulties related to the introduction of new technology into production which now affect the sale of licenses and, correspondingly, the acquisition of necessary instruments abroad.

Vinogradov on Information Transfer

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 7, Jul 81 pp 76-78

[Speech by V. A. Vinogradov, corresponding member of the USSR Academy of Sciences, at the annual general meeting of the USSR Academy of Sciences]

[Text] A. P. Aleksandrov, in his opening remarks, and P. N. Fedoseyev, in his report, clearly and thoroughly dealt with the characteristic features of the new stage of development of Soviet science related to the needs of the country under the conditions of mature socialism; they showed the large scale of the tasks put before the Academy of Sciences in the documents of the 26th CPSU Congress, especially in the program report by the General Secretary of the CPSU Central Committee, Comrade L. I. Brezhnev, which has historical significance.

In the "Basic Directions for the Economic and Social Development of the USSR for 1981-1985 and for the Period to 1990," attention is given to the necessity for improving collection means and systems and the transfer and processing of information.

The necessity for automating information systems and networks in the field of social sciences is dictated by the growing role of these sciences, and by the

necessity for operationally processing ever increasing volumes of primary information both in the conduct of scientific research and in decisionmaking at all levels of management.

Information systems and networks are a part of the economic structure with which the country will enter the 21st Century. We must keep this in mind today as we lay the foundation for their development.

The presidium of the USSR Academy of Sciences, in recent years, has done much for improving information in the social sciences, which have become an important condition for raising the theoretical level of scientific research, for improving the teaching of social sciences, and for strengthening the effectiveness of ideological work.

The Institute of Scientific Information for the Social Sciences of the USSR Academy of Sciences published 4676 titles of information publications with 25 thousand printed pages from 1976 to 1980. These publications contained bibliographic information on 1.2 million Soviet and foreign books and articles, over 45 thousand detailed abstracts of current Soviet and foreign works in the social sciences, and about one thousand review materials.

During the last two years, just with respect to the problems "Developed Socialist Society" and "The International Revolutionary Movement of the Working Class," over 120 information publications were put out. The institute as a whole purposefully provided information for research and development on 55 current, primarily complex, problems in Soviet social sciences.

The institute undertook efforts to provide information to representatives of the natural sciences and a wide scientific community. Information publications have come out on the social and ideological problems of ecology, philosophical questions in the natural sciences, problems in the organization of science in foreign countries, the effectiveness of scientific research, and questions of scientific creativity. These publications are well known to members of the USSR Academy of Sciences.

The institute is working on a program for expanding and deepening information activity stemming from the decisions of the 26th CPSU Congress.

The institute is actively developing international relations with countries of the socialist fraternity. A special place here is occupied by the International Information System for the Social Sciences of the Academies of Sciences of the Socialist Countries (MISON), an agreement for the creation for which was signed in 1976.

Within the framework of this system, joint abstract and bibliographic publications are put out; progressive forms and methods for information work are being developed; and automated information systems are being devised.

This work was evaluated positively by the Conference of Vice-Presidents of the Academies of Sciences of Socialist Countries on the Social Sciences, which took place in June 1980 in Prague. The secretary of the Czechoslovak Communist Party Central Committee, Josef Gavlin, highly praised the significance of MISON in an article, "The Growing Role of Social Sciences," published in 1980 in the journal "Problems of Peace and Socialism."

One of the results of our activity during the last five-year plan was the formation in the country of a system of information with distributed data banks. Along with the Institute of Scientific Information on the Social Sciences of the USSR Academy of Sciences (INION) as the chief all-union center, this system includes several national ministerial centers, particularly on cultural problems, republic centers of scientific information on the social sciences created under the presidiums of the union-republic academies of sciences, and also information services of scientific and higher educational institutions. Thus, the necessary preconditions have been created for effective functioning and interaction of the central data bank at INION and specialized data banks that accumulate data according to their spheres of activity.

The task for 1981 to 1985 will be to put into full operation an automated information system for the social sciences. However, on the basis of existing technology, this is not possible -- all our resources have been exhausted. The planned capacity of the INION system is calculated for the processing of 300 thousand documents a year, but the capacity of magnetic disks that the institute has permit the introduction of only 50 thousand; the storage in the data base available to consumers in a regime of direct computer interaction is only 12 to 15 thousand documents. The picture is approximately the same with display units.

The 26th CPSU Congress paid special attention to the necessity for concentrating efforts and resources under the 11th Five-Year Plan on the main areas and on the trigger points. P. N. Fedoseyev stressed in his report that the concentration of resources in science must first of all be in areas with the best prospects.

In our opinion, it is necessary in the shortest time (one or two years) to fully equip large information centers that have shown a capability to accomplish tasks at the current world level.

The presidium of the USSR Academy has created the Joint Information and Library Council of the USSR Academy of Sciences, under the chairmanship of Academician Yu. A. Ovchinnikov, vice-president of the USSR Academy of Sciences. The first meeting of the council showed what a large number of questions need to be resolved in the near future. It seems to us that all of the electronic technology available to the academy should be distributed with consideration of this council's recommendations.

Work on creating present-day automated systems for social sciences is a complicated complex of scientific-technical problems. We are counting on growing assistance from the presidium of the USSR Academy of Sciences and the USSR State Committee for Science and Technology. The solution of this problem will help achieve more successful development through Soviet social sciences of important theoretical and practical tasks put before us by the 26th CPSU Congress.

Belyakov on Basic Research

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 7, Jul 81 pp 82-83

[Speech by V. P. Belyakov, a corresponding member of the USSR Academy of Sciences, to the annual general meeting of the USSR Academy of Sciences]

[Text] The report by P. N. Fedoseyev has already pointed out the great significance of implementing fundamental research in practice.

Among the fundamental sciences whose successes directly influence scientific-technical progress in various economic sectors and in various technology sectors, there is a relatively young science, cryogenics, which is engaged with methods for producing cold at temperatures from 0 to 120 K and with research on processes that take place at these temperatures.

It must be said that this science has become the basis for the development of cryogenic and, to some degree, vacuum technology, and cryogenic technology has played a large role in the creation of new technologies in metallurgy, chemistry, and power, and, of course, it will also play this role in the future. In the economy, especially in metallurgy and chemistry, there are more than 500 air-fractionating facilities, which support the production of steel, iron, and nitrogen, and help significantly to reduce expenses and raise labor productivity at metallurgical enterprises.

But are we fully using the existing achievements?

In metallurgy today we use very advanced oxygen convertor methods to smelt, in all, about a third of our steel, at the same time that, for example, in Japan, they use it for 100 percent and, in other developed capitalist countries, for over 90 percent. It is important to make wider use in metallurgy of the new highly effective method for producing steel. The Academy of Sciences and the State Committee for Science and Technology must have a substantial influence on this.

Let us take the food program. Here, it has already been stated that it is important not only to create, but to store and preserve what has been grown. A powerful means for providing long storage of food products is the application of liquid nitrogen. A great deal of attention is being given to this means for storing, transferring, and transporting. In our country, analogous projects are only in an initial stage. In recent years, they have begun to use this method in the Ukraine, but the efforts of scientific workers and practitioners and workers in the food, meat, and dairy industry are needed to disseminate this method as widely as possible. This will permit the reduction of losses.

Cryogenic technology permits the accomplishment of completely new tasks. Today, a cryogenic superconducting facility is operating successfully. But it is perfectly clear that definite efforts are needed for maximum introduction of automation at these facilities. It is necessary to replace the immense control systems which operate them with systems that are smaller and more convenient to operate.

I think that cryogenic technology will make a large contribution to the development of power and to the improvement of processes related to superconductivity. This per-

tains not only to MHD-generators, superconducting electrical transmission lines, electrogenerators, and high-power cryoengines, but also to hydrogen power engineering. Undoubtedly, cryogenic technology will help produce liquid hydrogen with relatively small energy capital expenditures.

Further, V. P. Belyakov dwelled on the problems of scientific-production associations. Such associations effectively aid the rapid creation and introduction of the newest technology. The problems in introduction of new technology that used to exist when scientific institutions and production enterprises were isolated, do not exist today. But the economic conditions in which scientific production associations operate today in themselves can undermine the basis for association activities.

How is the work of scientific-production associations planned? The same as the work of any series-production factory: with indicators of profit and volume of production. How are the prices of manufactured goods determined? By the sum of the cost and standard profit. But for new technology, we need to "forget" for a while about cost. Cost for new technology is a drag on its development. A new manufactured item should be evaluated not by how much material has been put into it, but by how much better it is than the items made before.

Academician N. P. Fedorenko has said that various methodologies for calculating the effectiveness of identical manufactured items come out differently. The Department of Economics must turn its attention to the development of pricing methods that would stimulate the creation and diffusion of new technology.

The second question is how to evaluate the activities of scientific-production associations. Planning not by gross output but by normative net output in itself does not answer the question for scientific-production associations or for enterprises engaged in the introduction of new technology. In essence, you see, the volume of profit is planned as before. And to make profit, it is more advantageous to produce expensive items with large materials content.

These small examples show how important and vital the problem is in creating new technology -- not only how to embody an idea in practice rapidly but also how to stimulate this embodiment with the correct system of pricing and the correct system for planning and evaluating the activities of an enterprise engaged in creating new technology.

Zhavoronkov on Incomplete Research

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 7, Jul 81 pp 83-86

[Speech by Academician N. M. Zhavoronkov to the annual general meeting of the USSR Academy of Sciences]

[Text] V. I. Lenin said that Marxism is not a dogma, but a guide to action. The documents and decisions of the 26th CPSU Congress, about which Academician P. N. Fedoseyev spoke vividly in his report, are such a guide to action, as well as an invaluable creative contribution to the treasure-house of Marxist-Leninist teachings.

High evaluation of the role of science and its contribution to the building of communism and to material and technical progress causes a feeling of pride and a feeling of gratitude to the party and government for their concern for its development. In this regard, a well-known speech by Academician I. P. Pavlov is recalled; at the International Physiological Congress in 1935, he said that so much attention was paid science in our country that it forces us, the managers of science, to be in constant uneasiness as to whether we can justify the confidence given us.

Such a rigorous attitude on the part of scientists toward their own work and such a high degree of responsibility are still necessary in our time, when the scales of scientific-technical research and allotments to science have grown immeasurably. In 1940 these allotments amounted to 300 million rubles, and in 1935 -- the year of I. P. Pavlov's speech -- they were somewhat less. As is known, they have been set for 1981 at the huge sum of 22.6 billion rubles. Scientific research has become more costly. This obligates us to be concerned constantly about raising its effectiveness. The decisive sector today, as stressed in the documents of the 26th CPSU Congress, has become the introduction of scientific discoveries and inventions into production. The integration of science and production is a vital necessity. Meanwhile, questions about the introduction of new technology up to now have been literally "the talk of the town."

In his report, Academician G. K. Skryabin recalled how an engine with a forechamber ignition was introduced; it took nearly 30 years. A number of similar examples could also be introduced. But there are also instances where new developments are introduced that later turn out to be worse than the old ones. Therefore, the distribution of the enormous sums being allotted for scientific research must be very well thought out and there must be concern for the correct structure of allocations and expenditures for science. Experience in foreign countries and the experience of many of our scientific institutes, particularly those like the Institute of Electric Welding imeni Ye. O. Paton of the UkSSR Academy of Sciences and the All-Union Scientific-Research and Planning-Design Institute for Metallurgical Machine Building, has shown that about one-third of all allocations should go to fundamental and applied scientific research and two-thirds to experimental and design work.

We understand very well that fundamental scientific research not only permits constant improvement in technology, but also can lead to revolutions in production. However, if fundamental and, especially, applied research is not carried through with experimental and design work, then the efforts are wasted, research results remain on the shelf and, consequently, after some time, these results won't be needed by anyone because at the present rates of scientific-technical progress they soon become outdated.

A few years ago, on an assignment from the USSR State Committee for Science and Technology, I became acquainted with the status of scientific research in one of our industrial ministries and I found that there a total of 18 percent of all allotments for science was spent on experimental and design work and 2 percent on fundamental research; all of the remaining funds went to applied research. It is perfectly natural that the results of this research were not, and could not be implemented because of the backwardness of the experimental and design work.

In this connection, I would like to support those comrades who have spoken here with proposals to create a material base at scientific institutes for testing the results of research projects on an increased scale.

A few years ago, Academician A. I. Tselikov wrote an article, "Give the Institute a Factory." It must be said that this call did not meet with understanding everywhere and a number of objections were raised against it. But there is no doubt that such a measure was necessary, at least for those institutes that conduct projects on the synthesis of new substances, develop new materials, investigate new technological processes because, without sufficient study of a process on a large scale, introduction into production, if it takes place at all, involves great difficulties.

We often blame workers in industry for sluggishness and lack of interest in new methods, new production processes, and so forth. But I think that these indictments are far from always just. Of course, there is inertia in industry that slows the process of introduction, for both objective and subjective reasons. But we must regard with self-criticism what we, the scientists, propose for introduction. Under careful examination, it turns out that many of our proposals are incompletely worked out, are economically infeasible, or insufficiently tested, and many examples can be introduced where, on the recommendation of scientists, new processes were introduced that proved worse than the old ones and led to losses and to a reduction in production effectiveness, and so forth.

For example, at one time, the aluminum industry, according to scientists' proposal, transferred from precalcined anodes to continuous self-annealing ones, and they talked about this as a great achievement. Actually, such anodes work well in electric furnaces for producing calcium carbide, where the temperature of the process exceeds 2000°C. But, in aluminum baths, the temperature is 950 to 1000°C, which is insufficient for graphitization of the electrode mass, and the anodes discharged unevenly in cross-section and, as a result, significantly increased the expenditure of energy and worsened shop working conditions. Now, the industry is again returning to precalcined electrodes.

Similar instances are not at all rare. They just result from poorly thought-out proposals and indicate that we seriously need to verify and substantiate our projects before sending them to industry, and we need not blame the ministries for sluggishness when there are any difficulties with introduction.

In this regard, an example for us should be L. Pasteur, 40 years of whose research, in the words of K. A. Timiryazev, gave medicine more than did 40 centuries of practice. Each of his new discoveries he handed over to the judgment of friends and foes and only after this did he propose it for practical use. Essentially, this is characteristic of every real scientist.

The Department of Physical Chemistry and the Technology of Inorganic Materials devoted two days to a discussion of the results of work by the institutes and other scientific institutions that it watches over during 1980 and the 10th Five-Year Plan as a whole, and also of the tasks in the 11th Five-Year Plan in the light of the decisions of the 26th CPSU Congress. But this is only the beginning. It is necessary, in a very serious way, to again examine all the designated problems and to concentrate effort on developing the more needed ones and the most hopeful ones from the scientific and technical-economic viewpoint.

A special feature of our department is that over half of the institute managers are tied directly to industry, just as the department as a whole is closely tied with a number of ministries and with scientific institutions oriented toward the economic sectors. Tasks of the department, along with fundamental research projects, are the synthesis of new chemical compounds and the study of their properties and the study of new inorganic materials: metal alloys, silicates (cements, glass, and ceramics), materials with various useful physical or chemical properties -- semiconductors, superconductors, piezoferroelectric crystals, materials for quantum generators, fiber optics, and other materials.

The Department of Physical Chemistry and the Technology of Inorganic Materials works in close contact with the Department of General Physics and Astronomy, and this is natural: materials for new technology are created as the result of joint work in the fields of chemistry, physics, mechanics, technology, metallurgy, and other related sciences. Such interaction largely determines the many successes achieved in our work. It would be incorrect, however, to be limited to what has been achieved. In evaluating our achievements, we need to ask ourselves: Can we say that we have done everything that we could?

I would like to say a few words with respect to agricultural science. We have had great successes in introducing high-yield varieties of wheat, cotton, and sunflowers. However, an undeservedly small amount of attention has been given to such crops as rice, millet, buckwheat, oats, soy beans, and certain other food and forage crops. The result of this is their low yield and the large gap between the record and the average yields. As examples, let me refer to the 1333-centner-per-hectare potato yield achieved by the team of kolkhoz worker Anna Yutkina in Novosibirskaya Oblast during the war years, which exceeded the average by a factor of more than 10, and the 203-centner-per-hectare millet yield achieved by the Kazakh farmer Chogonak Bersiyev, which exceeded the average by a factor of 25. Their experience must be utilized both by scientists of the All-Union Academy of Agricultural Sciences and directly by the Ministry of Agriculture.

Glebov on Interdepartmental Cooperation

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 7, Jul 81 pp 95-97

[Speech by Academician I. A. Glebov to the annual general meeting of the USSR Academy of Sciences]

[Text] Speaking about the necessity for reaching the advanced frontiers of science and technology in all sectors of the economy, Comrade L. I. Brezhnev, in his report to the 26th CPSU Congress, said: "The CPSU Central Committee is in favor of further enlarging the role and responsibility of the USSR Academy of Sciences and improving the organization of the whole system for scientific research." The chairman of the USSR Council of Ministers, Comrade N. A. Tikhonov, stressed in his report the importance of more flexible combinations of ministerial and regional management and the concentration of efforts on the fulfillment of special-purpose programs.

The Interagency Coordination Council of the USSR Academy of Sciences in Leningrad was set up precisely for uniting the creative efforts of scientific-research institu-

tions and higher educational institutions in the Northwest Region under the aegis of the USSR Academy of Sciences. Coordination must embrace fundamental and the most important exploratory research with respect to both national and regional programs and problems.

Within the framework of the Interagency Coordination Council have been created 14 scientific councils on areas in which Northwest scientists can make the largest contribution to science and technology and, in first priority, to the fulfillment of special-purpose programs and programs for scientific-technical progress of the State Committee for Science and Technology and the USSR Academy of Sciences.

We attach great significance to the interaction of the Interagency Coordination Council with the presidium and committees of the Leningrad Oblast Council of Scientific-Technical Societies, and also with the central administrations of the all-union scientific-technical societies that are located in Leningrad. The Interagency Coordination Council has also concluded an agreement for cooperation with the Ministry of Higher and Secondary Specialized Education. Joint work by scientific councils and the corresponding committees of scientific-technical societies, and also with councils for economic and social development of oblast party committees open up great possibilities for utilizing the results of scientific projects in the economy.

We have been successful in conducting a large volume of preparatory work on problems in the fuel-energy complex. Almost half of our scientific councils participate in this work. The implementation of developments is accelerated by close interaction with the oblast staff, which operates under the Leningrad obkom of the CPSU, with respect to the complex program for Leningrad organizations, "Increase in Effectiveness of the Fuel-Energy Complex of the Country. The coordination of solutions to scientific problems is under the direction of the Interagency Coordination Council, while production organization tasks are under the direction of the oblast staff.

Participating in fulfillment of this complex program are 165 organizations, including over 50 academy and ministerial scientific-research, design, and technological institutions, over 40 production enterprises and associations, about 30 planning and prospecting organizations, and 10 higher educational institutions.

The program, which includes a broad totality of intricate, mutually related scientific, engineering-technical, and production-organizational measures, has been broken up into separate subprograms for specific areas: thermal energy and atomic machine building, hydroelectric power, the transmission of electric energy, the rational utilization of fuel and energy resources and the improvement of energy-consuming technological processes, new means for producing energy, the strengthening of the country's raw material base, generator building, turbine construction, boiler construction, and other fundamental research. This research is conducted in close interaction with the Department for the Physical and Technical Problems of Power Engineering of the USSR Academy of Sciences.

In connection with the conduct of work on this complex program, attention must be given above all to problems relating to the solution of one of the most important state problems -- the exploitation of the Kansk-Achinsk Coal Basin.

Because of the low calorie content of the Kansk-Achinsk coal, a complex problem has arisen in the creation of boiler systems for turbine units with a capacity of 800 thousand kW. The use of traditional means for igniting fuel leads to the necessity of installing boiler systems about 120 m high. As a result of research, boiler systems of conceptually new design were developed, with a new means for igniting fuel. The new solution permits reducing the height of boiler systems to 42 m. It is extremely important to accelerate work in this area, so that the use of the old, cumbersome versions will be eliminated.

The transmission of electric energy from the first two electric power stations in the Kansk-Achinsk Basin with the capacity of 6400 kW each can be accomplished by one direct-current transmission line of 2250 kV. But the projected rates of development for this line are patently inadequate. The current five-year plan proposes to limit it to technical-economic substantiation, when there is a real possibility to move significantly further along: to complete the research and draw up a technical plan.

To raise the efficiency of electric power stations and reduce environmental pollution, it is necessary to develop research on gas-vapor equipment with the goal of creating a gas-vapor system with a capacity of 1 million kW, with internal-cycle gasification of hard fuel.

In the field of generating electrical energy, there have been a number of important achievements. On the basis of fundamental research on electromagnetic, thermo-physical, and mechanical processes in generators that employ the phenomenon of super-conductivity, success has been achieved in creating and testing the first super-conducting turbogenerator in the world with a capacity of 20 thousand kW and with liquid-helium cooling of the rotor coils. On the basis of this work, a turbogenerator with a capacity of 300 thousand kW will be created during the current five-year plan. By 1990, a machine with a capacity of 1 million kW is foreseen.

It must be stated that superconducting generators will solve two contradictory tasks: they will reduce weight by about half and simultaneously raise efficiency to 99.3 or 99.4 percent. In addition, the capacity of such machines can be increased to 5 million kW or more, which is not possible on the basis of traditional solutions.

There is a second problem in the field of power generation. While working on the development of traditional large-capacity turbogenerators, a conceptually new scheme for cooling turbogenerators was successfully implemented. In this scheme, the water is supplied for cooling the rotor coil, omitting the shaft of the machine, which radically simplifies the design and sharply increases the operational reliability of the machine. This class of machine opens up the possibility of eliminating the use of mineral fuel and hydrogen. These machines offer extremely good prospects for our power engineering. At the present time, one such machine with a capacity of 800 thousand kW is undergoing final testing at a GRES. The production of a second machine of this type is planned.

I would like to note further that for atomic electric power stations, there is great significance in the research and development being conducted under the current five-year plan for creating steam turbines with a capacity of 1 million kW with the rotating frequency of 3000 revolutions per minute.

In conclusion, I. A. Glebov supported the proposal by P. N. Fedoseyev on the advisability for discussions at sessions of the general meeting of the USSR Academy of Sciences of urgent problems in the development of the economy, such as power, technology, mineral resources, and machine building.

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INCREASING EFFECTIVENESS OF VUZ'S IN S&T WORK

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 6, Jun 81 pp 71-73

[Article by S. Ya. Svirskiy, doctor of philosophical sciences: "The VUZ Department and the Academy Institute"]

[Text] In "The Basic Directions for the Economic and Social Development of the USSR for 1981-1985 and for the Period to 1990," the necessity is noted for improving the higher educational system and for utilizing more fully the potential of higher schools for accelerating scientific-technical progress. The party and government have given these problems a great deal of attention. It is sufficient to recall the decrees of the CPSU Central Committee and the USSR Council of Ministers "On Measures for Further Improvement in Higher Education in the Country" (18 July 1972), "On the Further Development of Higher Schools and Improving the Quality of Specialists' Training" (29 June 1979), and "On Increasing the Effectiveness of Scientific Research in Higher Educational Institutions" (6 April 1978). Documents of the 26th CPSU Congress put new tasks before higher schools that demand, particularly, increasing the effectiveness of scientific research by VUZ scientists and fuller "utilization of the scientific potential of VUZ's, in which almost half of all our doctors and candidates of sciences are concentrated."*

Actually, the scientific potential of higher schools is extremely impressive. There are 30,500 departments, 60 VUZ scientific-research institutes, and over 1500 problem laboratories and laboratories oriented toward economic sectors and, in addition, about 2 million students have been involved in scientific work.** However, reproaches are often addressed to VUZ scientists to the effect that neither the volume of scientific research, the rates of development of this research, nor its effectiveness correspond to its potential. It is also said that one of the chief reasons for the

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* "Report of the CPSU Central Committee to the 26th CPSU Congress and the Ensuing Tasks of the Party in the Field of Internal and External Policy." PRAVDA, 1981, 24 February.

** See "Tasks for Higher Educational Institutions in the Implementation of the CPSU Central Committee and USSR Council of Ministers Decree 'On Further Development of Higher Schools and Improving the Quality of Specialists' Training'." Report by V. P. Yelyutin, USSR minister of higher and secondary specialized education, in the book "All-Union Conference of Workers of Higher Educational Institutions in Moscow 6-8 February 1980. Moscow, "Vysshaya shkola", 1980, p. 53.

low effectiveness of VUZ research and development is the disconnectedness, its petty subject matter, and insufficient concentration of effort on the most important problems of science. The reproaches are justified, but their chronic character itself indicates that the roots of these shortcomings are quite deep. While not pretending an exhaustive analysis of the performance of scientific research in higher schools, let us try to examine the situation that has evolved in departments of many VUZ's (with their impressive number of scientific-research institutes, problem laboratories, and other units of VUZ science, the departments themselves are the "basic scientific units of higher schools" *).

On the average, in a VUZ department, there are 10 to 15 people, including instructors that are engaged mainly in accumulating pedagogical experience -- an adaptation that takes three years. The department itself represents first of all a collective of teachers and its chief duty is to conduct education at a high professional and political-ideological level. Scientific work here is not the chief or final goal as in a scientific-research institution. Accordingly, the chief criterion in the competitive selection of department associates is the capability of the competitor to provide the necessary lecture courses. Ability for scientific-research activity and talent for teaching and lecturing rarely coincide and, at a VUZ, as a rule, the preference is for the latter.

Further, there is a completely valid preference in a VUZ department for people with experience in scientific work. But such teachers, before coming to the department, have acquired a specialization and a definite kind of scientific work and they do not wish to change it -- and this would also be inadvisable.

Thus, in the best instance, the VUZ department represents a scientific mini-collective, often a multi-type one besides, covering a number of mixed specialties and disciplines; the base, as a rule, is the teaching laboratory and only sometimes is it a scientific laboratory that exists because of contract work.

All this basically differs from the situation in a large scientific-research institution, especially in an academy institute, where there are scientists of world reputation and where laboratories and sections cooperate and have a first-rate material base, their own computer center, and maintain continuous contacts with similar scientific institutions abroad, and so forth.

It is in such places that modern science is more successfully created, and the advantages of such a collective in comparison with the double or triple number of VUZ teachers are obvious. It is also obvious that under present conditions, making and conducting an integrated scientific policy within the framework of a VUZ department is a task that is more than complicated and is sometimes unattainable. (Of course, in large central VUZ's -- such as Moscow State University, Moscow Higher Technical School, and Leningrad State University -- the conditions for scientific work do not differ from those in the best research institutes, but there are not many such VUZ's.)

However paradoxical, the cooperation today between VUZ's and academy institutes only aggravates this problem. As is known, one of the basic forms of assistance by such

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* Ibid.

institutes to VUZ's is the training of teaching personnel in special-purpose postgraduate programs. But a postgraduate's dissertation topic is determined, as a rule, not by a scientific problem at the VUZ department that sent him there, but by the problems of the scientific institution where he studies. Subsequently, the young scientist who has completed study at an academy institution, often finds it difficult to abandon his topic and switch to a new one. At the same time, conditions for working on the former topic may simply not be present at the VUZ.

That is why it seems quite necessary not simply to continue to strengthen ties as actively as possible between higher schools and academy and ministerial scientific-research institutes, but to search for new, more flexib le forms for such ties.

The urgency of the answer to this question was defined in an instruction by Comrade L. I. Brezhnev in a report to the 26th CPSU Congress on the necessity of increasing the role and responsibility of the USSR Academy of Sciences in improving and organizing the whole system of scientific research. "This system," stated L. I. Brezhnev, "must be significantly more flexible and mobile . . . "

In this context, the thought of Academician Ye. P. Velikhov, vice-president of the USSR Academy of Sciences, seems extremely fruitful; he speaks of the desirability of creating basic VUZ departments and branches which would conclude agreements with scientific centers (including institutes of the USSR Academy of Sciences) that have the appropriate material base, the tradition, and significant scientific capabilities "to allow attracting specialists working at the advanced frontiers of science to enter teaching. Thereby, the possibility would be created for a definite 'rotation' of teachers in departments, that is, a planned exchange of teachers and researchers."*

Thus, it is possible, in many instances, that it would be useful to send VUZ department members as nonstaff associates to appropriate scientific-research institutes according to the subject matter in which these teachers work, instead of organizing scientific work within the framework of the department. The scheduling of lecture work can easily be planned so as to free the teacher from one to three days a week for work in an institute laboratory as if he were a member of the scientific collective. The activities of such an associate should be considered as VUZ department scientific work, being reflected both in department plans and in teachers' individual plans. The fulfillment of a plan would be determined by reports from appropriate sections or laboratories of the institute.

Contact between VUZ teachers and an institute can be even more fruitful in the case where the VUZ department as a whole works on one topic. In this case, it is all the more useful to strengthen contact with an academy or ministerial institute as if it were a section or other unit but also it is essential to formulate it organizationally, to implement the management of its scientific activity in the same form as in the institute's own collective, to control and to include VUZ department work in the institute plan, to provide appropriate material opportunities, and so forth.

It is possible that such organization of VUZ research opens a path that will permit further utilization of the chief component of the scientific potential of higher

* "The All-Union Conference of Workers of Higher Educational Institutions in Moscow, 6-8 February 1980, p. 161.

schools -- the large numbers of highly qualified personnel -- and partly compensate for the lack of supply-and-equipment support and organizational support in VUZ science.

Finally, with such a form of cooperation between scientific institutions and VUZ departments, the selection of an institute for sending VUZ graduates and young associates of departments for special-purpose postgraduate training would be made easier and, at the same time, after its completion and dissertation defense, the teacher would not experience difficulties in conducting department scientific work, as is now the case, but would fruitfully continue it in the same collective. VUZ department teachers who are granted sabbatical leave to complete doctoral dissertations would find themselves in the same favorable situation.

All this, undoubtedly, would significantly strengthen the effectiveness of the assistance given today by scientific-research institutes in the training of highly qualified personnel for higher schools.

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AzSSR ACADEMY OF SCIENCES SCIENTIFIC RESEARCH DEVELOPMENT

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, May 81 pp 3-11

/Article: "Basic Trends and Prospects for Development of Scientific Research by the AzSSR Academy of Sciences"/

/Text/ The AzSSR Academy of Sciences is the country's major scientific center. Guided by the documents and decisions of the CPSU Congresses concerning the development of Soviet science, technology, and culture, and by the directives and recomendations of the republic's executive organs, they have carried out a great deal of work on further developing basic research, increasing the effectiveness and quality of scientific studies, strengthening and improving the ties between science and production. The basic trends and prospects for the development of scientific research by this republic's academy were discussed at one of the sessions of the Presidium of the USSR Academy of Sciences.

Delivering the report at this session of the Presidium was the president of the AzSSR Academy, corresponding member of the USSR Academy of Sciences, G. B. Abdullayev.

The rapporteur dwelt on the successes achieved by the AzSSR in the development of economics and science. Functioning at present in Azerbaijan are more than 100 scientific research institutes; more than 22,000 scientific workers are employed here, including approximately 1,000 doctors of science and 8,000 candidates of science. This republic's VUZ's have an enrollment of more than 100,000 students.

Created in January 1945, the AzSSR Academy of Sciences includes 30 scientific institutions; among them are 25 institutes as well as a network of design bureaus and experimental plants. Working in the Academy's institutions are more than 12,000 persons, including 270 doctors of science and more than 1,800 candidates of science. About 600 graduate students are enrolled in graduate work at the academy; 140 probationary graduate students of the academy are undergoing training at scientific institutions in Moscow, Leningrad, Kiev, and other scientific centers. The annual budget of the AzSSR comprises approximately 40.6 million rubles, including 20 million for projects in accordance with economic agreements.

The principal problems confronting the Academy have derived from the tasks assigned by the 25th CPSU Congress and the 29th Congress of the Communist Party of Azerbaijan.

Of the 550 topics which were being worked on in 1979, 377 were of All-Union importance. They were very carefully examined in the USSR Academy of Sciences and were approved by the USSR State Committee for Science and Technology. During the last few years the Academy's institutions have carried out important basic and applied research studies in the fields of astronomy, mechanics, electronics, and other physical and mathematical sciences, geological-geographical and biological research, along with important projects in the areas of the agricultural sciences, social sciences, economics, and culture. Also being developed are such new scientific trends as the neurophysiology of the brain, molecular genetics, and molecular biology. Broad prospects are opening up for the development of chemical research and the study of natural resources. Basic research is being conducted in the sphere of the social sciences, linked with the radical changes in all spheres of Azerbaijan's life.

Speaking at the ceremonial session, devoted to awarding the Order of Lenin to Baku, the general secretary of the CPSU CC and chairman of the Presidium of the USSR Supreme Soviet, Comrade L. I. Brezhnev noted the following: "...today Azerbaijan is not only a region of oil derricks. Also developed here are machine building, chemical, electrical-engineering, electronics, and radio-engineering industries, along with non-ferrous metallurgy and other sectors." This has become possible, to a considerable extent, thanks to the achievements of science in the republic.

During the past 10 years many developments by the AzSSR Academy of Sciences have been introduced into the national economy. The over-all economic effect from such introductions has exceeded 510 million rubles. During this same period the Academy's scientists acquired 1,100 authorship certificates for inventions; moreover, on 57 of them 200 patents have been obtained in 34 of the world's countries. Three licenses have been sold (in the United States, Italy, and Bulgaria). An increase in the effectiveness of NIR /scientific research work/ and OKR /experimental design work/ has been facilitated by the creation of new scientific and production associations within the body of the Academy of Sciences. The annual volume of operations has reached 15 million rubles.

The Academy is the leading and coordinating organization in the country with respect to research on selenium and tellurium and instruments based on them, as well as with respect to magnetic semiconductors, developing medical thermo-electric apparatus, and synthetic naphthenic acids.

Institutions of the AzSSR Academy of Sciences actively participate in international scientic cooperation among the socialist countries. Joint projects are being carried out on 14 topics. It is coordinating the sub-satellite range studies which are being conducted in the socialist countries on the problem of studying the Earth from outer space.

G. B. Abdullayev further enumerated certain very important research trends being carried out at the Academy. One such trend is the physics and technology of crystals. Obtaining semiconductors, studying their properties, utilizing and creating new transducers has attracted the attention of a large group of the republic's physicists and chemists. A great deal of attention is being devoted to the study of selenium--the only polymeric semiconductor in the Mendeleyev Table which plays an important role in the vital activities of plant and animal organisms. In conjunction with their colleagues from the Institute of Biology of the USSR Academy

of Sciences, Azerbaijan's biologists have succeeded in establishing the selective inhibitory effect of selenium on the activity of RNK /ribonucleic acid/-polymerase-1 in isolated nuclei.

The basic research studies which have been conducted have allowed us to work out a technology for obtaining new layered, including anisotropic, semiconductors, based on selenium and tellurium, by means of a well-targeted synthesis of crystals and their groups with the prescribed properties and to create a series of new transducers. At present they have succeeded in obtaining monocrystals with rigorously parallel natural surfaces. These monocrystals furnish an interesting object for studying the tunneling of current carriers and for the creation of new transducers. We have discovered previously unobserved effects, which have allowed us to create and put into industrial production new decoders, modulators of laser radiation, memory elements, receivers and sources of coherent radiation, as well as micro-coolers for receivers of infra-red radiation.

Projects are being actively carried out in the field of metallurgy. New types of economic steel alloys are being created and put into production. A new method has been developed for obtaining iron powder at temperatures below 1000° C. Such relatively low temperatures allow us to avoid adherence and, thanks to the convection of natural gas, we can obtain a good quality of powders. This method is utilized for the manufacture of parts for refrigerators and air conditioners.

The Academy's chemists are working on the creation of the scientific foundations of the comprehensive refining of petroleum and raw materials, on creating effective catalysts for the processes of oil refining and petrochemistry, and for obtaining the products of "small-scale" chemistry. The Academy's organic metallurgists have worked out a method for imposing on the surfaces of metals and ceramics coatings made of such refractory metals as tungsten, by means of the thermal disintegration of these metals' organic compounds. By using low-temperature, electro-chemical methods, they have succeeded in setting up production, under ordinary conditions, of pure arsenic, tellurium, selenium, rhenium, and their compounds.

Of great importance for oil extraction and refining and environmental protection is the chemical reagent "Azerbaijan-4," which was created at the Academy; it is designed to purify water from oil and to soften it. In a concentration of 25 g/m^3 this reagent allows us to reduce the oil content in polluted water from 100 to 3 g per liter. The reagent is pumped into an oil stratum in order to increase the oil yield and to avert pollution of the environment by oil.

Another modification of the reagent allows us to reduce water hardness from 5.5 g of salts per liter to 1 mg per liter. The technology has been developed and introduced for utilizing the reagent in purifying drill-well water and seawater. In particular, we have succeeded in oil refineries in creating a circulating water supply and in bringing seawater up to conditions good enough to be used in thermal electric power stations.

Research has been expanded, directed at utilizing new types of energy, including studies in the use of hydrogen energy engineering, utilizing solar energy, and wind power. Already at present in the Caspian Sea units are in operation, converting solar and wind energy into electric power. By means of utilizing solar energy we have succeeded, in particular, in preventing corrosion on marine structures.

One of the traditional trends of basic research at the republic's Academy of Sciences is the study of the geological structure of the Earth's crust, the role of depth processes in the formation and distribution of minerals. The geologists have provided a new, scientifically grounded forecast estimate of the oil and gas resources on the republic's territory, and they discovered the zones with the greatest accumulation of hydrocarbons. Large-scale, geomorphological and landform maps of Azerbaijan have been compiled, as well as maps of the quaternary deposits and the dissemination of radioactive elements in the ploughed layer of the soils.

With regard to the Biological Sciences Department the principal future trend is research on the laws of formation and development of Azerbaijan's flora, the appearance of valuable plants and their introduction into cultivation, the study of the problems of the physiology, biochemistry, biophysics, and genetics of plants as the theoretical basis of agriculture, working out the theoretical fundamentals of the heredity and mutability of plants and animal organisms.

The Academy's scientists have evolved new and productive species of agricultural plants, hard and soft wheats, cotton plants, and mulberry trees. A new, high-yield soft wheat has been created and adopted to grow within this republic. A new, fat-and-milk-producing breed of Caucasian buffalo has been created and introduced for livestock raising.

The biochemistry of Azerbaijan's flora is under active study. In particular, there has been a successful introduction into ophthalmological practice of the use of saffron for improving the activity of the organs of vision in cases of the disease of dystrophy. The technology has been worked out for obtaining a number of biologically activemedicinal compounds derived from the waste products from processing meat and fish, and their production has been set up. This is all the more important inasmuch as certain compounds up to now have been successfully obtained only from Caspian sturgeon--the fish in other regions evidently has other biochemical characteristics.

The Academy's social scientists are conducting work along three principal lines: working out general theoretical and methodological problems of social sciences, as well as the urgent problems of building communism; Azerbaijanian and Caucasian studies as a whole; and the study of the history, culture, and economy of the countries and peoples of the Near and Middle East.

G. B. Abdullayev further informed the session that, with the aid of the USSR Academy of Sciences, construction has begun on a scientific-research vessel with a displacement of 1,130 tons. And he emphasized the need to speed up work on solving fuel-and-energy problems, on utilizing the latest methods of discovering, extracting, and refining oil and gas from deep deposits, on making use of the energy of the Sun and the wind, on developing hydrogen-energy engineering.

Delivering a co-report was a vice-president of the USSR Academy of Sciences, Academician Yu. A. Ovchinnikov, who headed up a commission of scientists, acquainting themselves with the work of the AzSSR Academy of Sciences.

After mentioning the successes achieved in the development of Azerbaijan's economy, Yu. A. Ovchinnikov noted that the development of science in this republic corresponds to the high growth rate of its economy. Azerbaijan's scientists occupy good positions in many fields of physics, especially solid-state physics; chemistry is

traditionally strong here, particularly petrochemistry; renowned far beyond the borders of Azerbaijan are the works of Azerbaijanian biologists connected with the development of medicine and agriculture; the achievements of scientists working in the field of Earth sciences are considerable. The rapporteur also noted the broad complex of projects being conducted in the area of the social sciences. The AzSSR Academy of Sciences, Yu. A. Ovchinnikov continued, is a scientific center comparable in scale with the Far Eastern or Urals Centers of the USSR Academy of Sciences. It is natural that it should be called upon to make a very serious contribution to scientific and technical progress.

One of the most important characteristics of the AzSSR Academy of Sciences is the presence of numerous design bureaus and experimental centers within its institutes; this allows a sharp acceleration in introducing scientific achievements into practice. A particular strong experimental-design center exists in institutes engaged in the study of chemistry and chemical technology; great possibilities for creating such a center also exist and are already being utilized in the field of physics. Similar institutions are being created and have already begun to operate successfully at biological institutes.

This aspect of the AzSSR Academy of Sciences' work is particularly important at present inasmuch as the small-series production of equipment and the low-tonnage output of various chemical compounds has taken on special significance these days. In particular, the Commission recommended that the AzSSR Academy of Sciences concentrate special attention on the output of items of the so-called small-scale chemistry--products of low-tonnage chemical production. These principally comprise substances such as additives, stabilizers, inhibitors, compounds for agriculture, pesticides, biologically and physiologically active substances for medicine. There exists a genuine possibility for creating in Azerbaijan an important center for producing such products for the entire Soviet Union.

Subsequently Yu. A. Ovchinnikov dwelt on the shortcomings in the work of the AzSSR Academy of Sciences, noting, first of all, the prevalence of petty topics, the lack of coordination between the operational profile of certain sub-divisions to the profile of the institutes which include these sub-divisions, as well as the low number of individual laboratories, including those working on extremely important problems. There should be a strengthening of the ties between Azerbaijan's scientific institutions with the institutes of the USSR Academy of Sciences; in the new trends of research it would be feasible to train large groups of young scientists simultaneously in the country's leading scientific centers. A top-priority task is strengthening the Academy's links with the republic's VUZ's--these links determine the possibilities for the progress of science and its future.

Then Yu. A. Ovchinnikov informed the session about the achievements of the AzSSR Academy of Sciences in developing specific fields of science.

The republic's scientists have had considerable successes in developing the complex of biological sciences. One of the country's foremost centers in the field of soil science and agrochemistry has been formed here; important results have been attained in the area of plant and animal genetics, particularly in solving the problems of remote hybridization, in physiology and in certain other branches of biology. Yu. A. Ovchinnikov emphasized, however, that new trends in biology must be intensively developed. There are possibilities for this. In particular, important projects are

being conducted in the Molecular Biology Department of the Institute of Physics. It is high time that we should convert this department into an independent institute of physical-chemical biology, which could become an important center for developing new trends in biology. Yu. A. Ovchinnikov noted the work of the Design Bureau of Biological Machine Building, which functions within this department, where models have been created of quite simple-to-produce instruments which are fully capable of replacing analogous instruments being imported from abroad. In Yu. A. Ovchinnikov's opinion, it would be feasible to request the AzSSR Academy of Sciences to expand their work in the field of biological machine building and to specialize in the output of certain types of equipment, bringing them up to the level of world standards, in order to guarantee that scientific institutions throughout our entire country be supplied with this equipment, and, perhaps, even to begin exporting it.

Under Azerbaijan's conditions great importance has been assumed by the development of a complex of social sciences, most of all, the study of the history and culture of the peoples of the Middle East, as well as the socioeconomic processes taking place in this region. It is also necessary to expand economic research, using up-to-date techniques and to strengthen the printing centers of institutions engaged in studying the social sciences.

In conclusion, the rapporteur gave high marks to the work of the AzSSR Academy of Sciences and noted that it has genuine possibilities for gaining a truly leading position in many important branches of scientific development.

A number of questions were then put to the rapporteurs.

In answering a question from the president of the USSR Academy of Sciences, Academician A. P. Aleksandrov concerning the scope of the introduction of applied projects into production, Yu. A. Ovchinnikov noted that at the AzSSR Academy of Sciences more scientific results are being introduced than at most of the other republic-level academies. According to this indicator, the AzSSR does not fall behind the Academies of Sciences of the Ukrainian SSR or the Belorussian SSR--and this is a high level of introduction. However, we have not managed to obtain data on the economic effect with regard to many things which have been introduced, since sufficiently serious economic analyses and appraisals have not been conducted in the AzSSR Academy of Sciences.

In answer to a question by A. P. Aleksandrov concerning the development and use of substances to increase the extraction of oil from strata, G. B. Abdullayev informed the session that intensive work was being conducted within the AzSSR on creating active reagents, based on surface-active substances obtained from the waste products of oil refining and other chemical production facilities. By utilizing these reagents under laboratory conditions, we have succeeded in raising oil output by 20 percent. A decision has been adopted to utilize these substances under industrial conditions.

A. P. Aleksandrov remarked on the importance of this work both for the republic and for the country as a whole, and he recommended that these substances be tried out both at the deposit sites and in other regions of the country.

Academician M. A. Styrikovich stressed the importance of the projects of the Baku school of hydrodynamics on exploiting complex deposits of oil and gas condensate in

a natural system, i. e., in a system with reduced pressure. At the AzSSR Academy of Sciences programs and calculations have been drawn up for developing complex deposits in Western Siberia, which at present cannot be developed by traditional methods.

Academician A. A. Bayev posed a question concerning the prospects for converting the Department of Molecular Biology of the Institute of Physics of the AzSSR Academy of Sciences into an independent institute. G. B. Abdullayev informed the session that during the last few years the material and staff potential of the department had become significantly stronger, and the Presidium of the AzSSR intended to submit a petition to organize an independent institute, based on this department.

Academician N. M. Zhavoronkov expressed an interest in the quality of oil additives which have been developed in the Academy's institutes. G. B. Abdullayev informed the session that the additives being produced on the basis of the Academy's development are enjoying great demand. The effectiveness of their utilization has grown considerably during the last few years in connection with improvement in the purification of the oils, inasmuch as the capability of these latter to accept additives depends on the purity of the oils.

In opening up the discussion of the reports, Academician-Secretary of the General Biology Department of the USSR Academy of Sciences, Academician M. S. Gilyarov noted the great achievements of the AzSSR Academy of Sciences in working out problems of soil science. Research which is new in principle is being conducted there. In particular, corresponding member of the USSR Academy of Sciences V. R. Volobuyev has developed a system of evaluating the mathematical characteristics of the interrelated factors of soil formation. Especially interesting are recent studies on the energy engineering of soils; these allow us to characterize the various types of Azerbaijan's soils with the utilization of precise methods. These results are being widely used in the national economy. Research is being conducted on a relatively high level in the classic fields of biology; however, it is feasible to expand these studies, particularly in the field of zoology, and, above all, that of entomology.

The work in mycology which is being conducted in this republic is extremely important; it is being headed up by Academician of the AzSSR V. I. Ul'yanishchev, who has been awarded the Lenin Prize for these projects.

There has been very good organization of projects for the study of plant cover; these studies, however, could be considerably more productive if the institutes conducting them were better equipped. As regards the training of large groups of specialists from Azerbaijan at the institutes of the USSR Academy of Sciences, at the present time, M. S. Gilyarov emphasized that do not have the right conditions, nor, above all, the places, for such a program.

Academician-Secretary of the Department of Biochemistry, Biophysics, and the Chemistry of Physiologically Active Compounds, Academician A. A. Bayev, joined in the high marks which M. S. Gilyarov had given to the research on soil science and agrochemistry which is being conducted in Azerbaijan. The weakness of biological research in the AzSSR Academy of Sciences is the lack within the system of biological institutions of institutes of a physical-chemical type. At the Institute of Physics, however, there is an operational sector of molecular biology in which a successfully operating group has already taken shape and important results obtained, in particular, models of instruments have been created.

A. A. Bayev remarked further on the work of the microbiology section, which is studying primarily the micro-organisms which are destroying petroleum and petroleum products. These projects are important both for environmental protection, for the struggle against its pollution by petroleum and petroleum products, as well as to avert the spoilage of the petroleum products themselves. Furthermore, A. A. Bayev emphasized the importance for present-day biology of the projects being conducted in the AzSSR in the field of "small-scale" chemistry, the creation and production of small-series equipment.

Academician-Secretary of Physical Chemistry and the Technology of Non-Organic Materials, Academician N. M. Zhavoronkov noted the general high level of the work of the chemical-type institutes of the AzSSR, including projects with regard to the theoretical problems of chemical technology as well as the creation and output of additives to lubricating materials. These projects must be continued and developed because, despite the successes which have been achieved, in our country, due to the shortage of additives and their insufficiently high quality, the expenditure of lubricating oils in internal-combustion engines is still too great. The improvement of additives and organizing their production is one of the principal tasks confronting Azerbaijan's chemists.

Academician-Secretary of the General Physics and Astronomy Department, Academician A. M. Prokhorov, awarded high marks to the condition of physics research in the AzSSR, above all, in the field of semiconductor physics and solid-state physics. He remarked on the good connections which exist between this department's institutes and the institutions of the AzSSR, and he expressed the desire that these links be developed even further. In the name of Academician R. Z. Sagdeyev, who could not take part in the session, A. M. Prokhorov expressed a great deal of satisfaction with the cooperation with the institutions of the AzSSR Academy of Sciences with regard to the creation and operation of the automated information center with its satellite link.

Academician-Secretary of the Department of General and Technical Chemistry, Academician N. M. Emanuel', proposed to support the initiative of the AzSSR Academy of Sciences in creating scientific-production associations in the field of "small-scale" chemistry. He noted the insufficient attention being paid by the production organizations to the chemical methods of increasing the petroleum yield from a stratum and the feasibility of creating, on the basis of the AzSSR Academy of Sciences, a center to engage in the development and coordination of appropriate projects.

In concluding the discussion, the secretary of the CP of Azerbaijan CC, K. M. Bagirov, expressed great gratitude and recognition for the attention to the development of Azerbaijanian science on the part of the USSR Academy of Sciences. Having mentioned the economic successes achieved by this republic during the 10th Five-Year Plan, he underscored the important contribution made by science to the development of Azerbaijan's economy. Thus, from 1971 through 1979 the scientific institutions of this republic's Academy of Sciences introduced into the national economy projects with an anticipated economic effect exceeding by a factor of 15 the indicators for the preceding 10 years. K. M. Bagirov noted that the Communist Party CC and the Azerbaijanian government have exhibited constant attention to the activities of the Academy, concerned themselves with strengthening the material and technical base of science, improving the comprehensive administration of scientific research, planning-design and experimental-industrial organizations, improving

the everyday conditions of staff members, and, in turn, they expect from the republic's scientists even more strengthening of basic research, further deepening of the study of the socioeconomic and political aspects of the scientific and technical revolution, increasing the effectiveness and quality of scientific developments, improving the training of highly skilled personnel, more extensive introduction of achievements into the national economy, and perfecting the ties between science and production.

In the name of the Communist Party of Azerbaijan CC K. M. Bagirov expressed confidence that the discussion of the activities of the AzSSR Academy of Sciences by the Presidium of the USSR Academy of Sciences will facilitate the solution of those responsible tasks which the Communist Party has assigned to Soviet science and, in particular, to the AzSSR Academy of Sciences.

In conclusion, the president of the USSR Academy of Sciences, Academician A. P. Aleksandrov noted those serious achievements which have been attained by the AzSSR Academy of Sciencesin many substantial trends of scientific research, and he proposed the approval of the basic directions of its activities, as well as wishing new successes for the AzSSR Academy of Sciences.

In its adopted decree the Presidium of the USSR Academy of Sciences notes the successes of the AzSSR Academy of Sciences in developing many areas of research. In this republic a major scientific school has been created in the field of functional analysis and its applications, new, complex semiconductors have been developed, as well as semiconductor compounds and their structures; a sub-sattelite information-measuring system has also been created. The technology has been worked out for high-strength, economical steel alloys which do not contain any deficit admixtures; also developed is the theory and technology of the process of obtaining multi-layered, reinforced shells, and this has allowed us to work out designs for high-strength, flexible hoses for the oil and gas industry, as well as the technological principles for the comprehensive processing of alunites and the accompanying petroleum waters, highly effective reagents for purifying natural, drilling waters and the industrial wastes from petroproducts, a highly effective process for obtaining aromatic nitriles by the oxidizing ammonolysis of hydrocarbons and a catalyst for producing them; all of these are of great importance for the national economy. Production has been set up of individual types of especially pure materials which are in short supply; a new, highly productive system has been proposed with a moving stream of a catalyst for the highly exothermic processes of obtaining ethylene oxide, formaldehyde, maleic and phthalic anhydrides, and allyl chloride.

In the field of Earth sciences an estimate has been conducted of the forecast resources of oil and gas, maps have been drawn up of prospective oil-and-gas-bearing areas, recommendations have been formulated for exploratory drilling, a new classification scheme has been worked out for the productive magmatite formations of the Lesser and Greater Caucasus, and experimental models have been created of the mobile information-measuring "Nature" complex for gathering meteo- and geophysical data.

In the field of the biological sciences research has been conducted on drawing up an inventory of Azerbaijan's flora and plant introduction; processes have been developed for obtaining valuable products from plant resources; measures have been recommended for protecting the forests, increasing the capacity of winter pastures,

on preserving and reproducing rare and disappearing species of animals, increasing the biological productivity of the Caspian Sea, developing fishing, on the biological methods of combatting plant pests and animal parasites; important results have been obtained in studying the organization and regulation of the complex-reflex, visceral, and somato-sensorial functions of human and animal organisms; a new compound has been introduced into production for preventing blood clotting--protominsulphate; the following new directions of soil science have been developed: soil ecology, the energy engineering of soil formation; the principles of humus formation and the saline regime of soils have been studied; land-improvement measures have been recommended for combatting their salinization. In the field of the social sciences a cycle of projects have been carried out on the history of Azerbaijan's working class, and a number of basic works have been published.

At the same time, a number of shortcomings have been noted in the Academy's work: a lack of conformity between the work of the individual institutes and the basic trends which have been approved for them, a multiplicity of topics and a dispersal of staff members, insufficient concentration of forces and funds on solving the most important problems, and insufficient participation in All-Union problems. There is excessive slowness in using the results of exploring for Mesozoic petroleum, in studying plant resources, and in projects for creating production lines without waste products. Work with regard to the biological study of the Caspian Sea has been too weakly developed. There is insuffiently activity in developing the problems of socioeconomic forecasting and the comprehensive utilization of the republic's productive forces, too little use has been made of mathematical-economic methods and computer technology; also being developed too slowly are problems of the republic's history, problems of the socioeconomic development of the countries of the Near and Middle East, and the role of ideological currents in the national-liberation struggle. Insufficient use is being made of the possibility of attaching scientific staff members of the AzSSR Academy of Sciences to the scientific institutions of the USSR Academy of Sciences in order to increase their skills.

The Presidium of the USSR Academy of Sciences has decreed the following:

to approve the scientific and scientific-organizational activities of the AzSSR Academy of Sciences, directed at developing the republic's science, economy, and culture;

to approve the principal trends of scientific research at the institutions of the AzSSR Academy of Sciences;

to recommend to the Presidium of the AzSSR Academy of Sciences that it bring the structure of individual scientific institutions and sub-divisions in line with their basic directions of scientific research, to activate the work of the republic-level Council on Coordinating Scientific Research in the fields of the natural and social sciences, and to adopt measures to improve the training of highly skilled scientific staff members, particularly with regard to specialties which are in short supply, at the leading institutes of the USSR.

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